EDISON ELECTRIC INSTITUTE BULLETIN

NO

NOVEMBER, 1940

Forgotten Men of Power History . . . . . PAYSON JONES 497

Final Plans and Complete Program Fourth National Accounting Conference 499

George Bruce Cortelyou 503

Reddy Kilowatt—Goodwill Ambassador-at-Large for 156 Electric Companies . . . 505

Pole Top Resuscitation Developments . . . . . W. R. SMITH 507

Voltage Drops in Radial Overhead Distribution Circuits . . . . W. R. BULLARD 509

Reconstruction of Single Pole 66-kv. Transmission Line for 110-kv. Operation J. F. PENNINGTON 513

Creosote Treatment of Douglas Fir Crossarms . . . . . L. G. SMITH 517

Method of Cable Identification and Determination of the Identity of Phase Conductors F. G. KARGLE 519

How'm I Doin'? . . . . . DR. MORRIS S. VITELES 525

Civic Cooperation in a Christmas Celebration . . . . . DON E. NEELY 527

"Alice in Electric Wonderland" Scores Big Hit 529

Accident Prevention Committee Meeting . . . . . W. R. SMITH 531

Transmission and Distribution Committee Meeting . . . . . W. F. NIMMO 532

Personnel of Sales Committees 534

Personals 535

Conventions and Meetings, 536

EDISON ELECTRIC INSTITUTE

THE ELECTRIC LIGHT AND POWER INDUSTRY

Current Statistical Data Covering 100 Per Cent of Industry

August, 1940

CLASSIFICATION OF SALES (Revised Series)

	1940	1939	%
Number of Customers as of AUGUST 31st			
Residential or Domestic	24,536,674	23,636,107	+ 3.8
Rural (Distinct Rural Rates)	673,001	613,770	+ 9.7
Commercial or Industrial:			
Small Light and Power	4,239,021	4,188,445	+ 1.2
Large Light and Power	180,563	186,113	− 3.0
Street and Highway Lighting	23,955	24,984	.....
Other Public Authorities	85,094	75,696	.....
Railways and Railroads:			
Street and Interurban Railways	212	213	.....
Electrified Steam Railroads	27	31	.....
Interdepartmental	1,257	1,124	.....
Total Ultimate Customers	**29,739,804**	**28,726,483**	**+ 3.5**
Kilowatthour Sales During the Month of AUGUST			
Residential or Domestic	1,827,771,000	1,621,861,000	+12.7
Rural (Distinct Rural Rates)	287,921,000	269,150,000	+ 7.0
Commercial or Industrial:			
Small Light and Power	1,915,394,000	1,767,725,000	+ 8.4
Large Light and Power	5,185,580,000	4,422,050,000	+17.3
Street and Highway Lighting	148,808,000	146,442,000	+ 1.6
Other Public Authorities	223,940,000	221,025,000	+ 1.3
Railways and Railroads:			
Street and Interurban Railways	299,145,000	298,943,000	+ 0.1
Electrified Steam Railroads	152,318,000	146,696,000	+ 3.8
Interdepartmental	58,001,000	52,110,000	+11.3
Total to Ultimate Customers	**10,098,878,000**	**8,946,002,000**	**+12.9**
Revenue from Ultimate Customers	**$201,936,200**	**$187,551,300**	**+ 7.7**

RESIDENTIAL OR DOMESTIC SERVICE (Revised Series)

Average Customer Data for the 12 Months Ended AUGUST 31st			
Kilowatthours per Customer	934	881	+ 6.0
Average Annual Bill	$36.33	$35.68	+ 1.8
Revenue per Kilowatthour	3.89¢	4.05¢	− 4.0

THE GENERATION FOR THE U. S. POWER SUPPLY AS A WHOLE FOR THE MONTH OF AUGUST WAS AS FOLLOWS (000's kwhrs)

	1940	1939	%	1938	1937
Fuel	8,248,284	7,480,839	+ 10.3	6,200,695	7,171,030
Hydro	3,880,216	3,453,220	+ 12.4	3,761,549	3,243,513
Total	**12,128,500**	**10,934,059**	**+ 10.9**	**9,962,244**	**10,414,543**

Vol. 8, No. 11, EDISON ELECTRIC INSTITUTE BULLETIN; published monthly. Entered as second-class matter Aug. 17, 1933, at the post office at Philadelphia, Pa., under the act of March 3, 1879. Publication office, 56th and Chestnut Sts., Philadelphia, Pa. Editorial office, 42 Lexington Ave., New York, N. Y. Subscription rate $2.00 per year in the United States; $3.00 per year in foreign countries

The Edison Electric Institute does not assume responsibility for, nor necessarily endorse or approve, statements made by contributors to the BULLETI

EDISON ELECTRIC INSTITUTE BULLETIN

Volume 8 NOVEMBER, 1940 No. 11

Forgotten Men of Power History

By Payson Jones

Consolidated Edison Company of New York, Inc.

THOMAS A. EDISON'S role in furnishing light to mankind enjoys world-wide recognition. Motion pictures, radio and television combine with the publishing industry, in all its branches, to tell the world the Horatio Alger story of the boy who became the most successful inventor in history. Already legendary, he will be remembered as a Promethean figure who, in the nineteenth century, banished the Age of Darkness by furnishing electric light to mankind.

Less well known is the part played by private enterprise in setting the stage for Edison's electric light inventions and in promoting their adoption throughout the world. Yet private enterprise can show no greater triumph than it won in 1878-1892 through the agency of the Edison Electric Light Company, which, without beating of publicity drums, provided the funds with which the Menlo Park electric light experiments were conducted. From the operations of this one corporation, organized for the purpose of making a profit, stemmed incandescent lighting companies throughout the world, as well as pioneer units of the electrical manufacturing industry. Yet the men who organized that corporation are now almost forgotten. Does the world resent the fact that, for the most part, they were Wall Street men? Or did these power pioneers prefer profits to publicity? Or have they been obscured in the fierce light which beats upon a throne?

Whatever their deserts, these founding fathers of the electric utility industry backed Edison with $300,000 of their own cash at a time when eminent men ridiculed the inventor's claims that he could "subdivide light." They will be remembered during observance in December of the 60th anniversary of the Edison Electric Illuminating Company of New York, a pioneer predecessor of the Consolidated Edison Company of New York, Inc., which was incorporated December 17, 1880. Their number included Grosvenor P. Lowrey, Egisto P. Fabbri, Norvin H. Green, Eugene Crowell, Henry Villard and others who, for all their prominence in 1878-1900, may be described as the forgotten men of power history. They were business men, not inventors; investors, not technicians. They lacked the glamour so often attached to men remembered in history. But they had the faith, the vision, the prudence and the organizing ability which brought the electric light and power industry into existence. They were the men who made it possible for Edison to invent the lamp, the high efficiency dynamo, the underground conductor, the meter and other central station elements. Once these inventions were made they organized the new-born industry on a world-wide scale. They made it pay. Doubtless they got their reward, yet an undistorted picture of electric light history cannot be formed unless they are given credit for their accomplishments. Through these men, founders of the Edison Electric Light Company and the Edison Electric Illuminating Company of New York, private enterprise made a lasting contribution to human progress.

The story of Edison's technical accomplishments at Menlo Park needs no repetition here. Edwin Marshall Fox, who scored the greatest electric light beat in newspaper history, covered the subject capably in his full page New York *Herald* article December 21, 1879, and other writers, including Francis Jehl, author of "Menlo Park Reminiscences," have done the job in detail. The technicians who stood beside Edison—Upton, Batchelor, Johnson, Bergmann, Kruesi, Dean, Jehl and others—are already assured a glorious place in electrical history. But the story of the business men who backed Edison bears retelling. Who were they? What was their background? What business talents did they place at Edison's command? How efficient were they in organizing a new industry? What other corporations stemmed from the parent company once Edison's basic electric light inventions had emerged from the laboratories at Menlo Park? In short, what right have they to a place in power history?

Edison and his intimate friend Grosvenor P. Lowrey were the principal founders of both the Edison Electric Light Company and the Edison Electric Illuminating Company of New York, which is known as the first New York Edison company. Edison was successively a director of the Edison Electric Light Company, the Edison General Electric Company and finally the General Electric Company, almost without interruption from 1878 until 1901. Nineteen times, in 1880-1899, he was elected board member of the first New York Edison company. His connection with the Pearl Street Station is established by an 1884 New York Edison minute book entry reading, "Mr. Edison was elected Engineer of this Company March 23, 1881, when a resolution was passed ordering him as engineer, together with the Executive Committee (Messrs. Edison, Navarro, Banker, Fabbri and Lowrey) to order the plant for the First

District. The matter was left to Mr. Edison under whose supervision the plant was installed, started and run." Edison had planned the construction of New York's central station system before the invention of the first successful incandescent electric lamp, the first 90 per cent efficient dynamo or the first underground conductor. He lived to see New York City served by an Edison central station system described as the largest steam-electric system in the world.

Lowrey, who played "House" to Edison's "Wilson," who gave the inventor his "open sesame" to the counting houses of Wall Street, who was primarily responsible for Edison's inauguration of the new lighting age, was no obscure investor seeking an outlet for his funds. He was the general counsel of the Western Union Telegraph Company and a shining light of the New York bar. He was a partner in the firm of "Porter, Lowrey, Soren and Stone, Attorneys and Counsellors at Law, No. 3 Broad Street, Drexel Building, New York," to quote an old letterhead. "This firm had for their clients Western Union Telegraph, Wells-Fargo, Drexel, Morgan & Company, and many of the most prominent companies of those days," Francis Jehl, the eminent Edison pioneer, recently wrote me. Not only did Lowrey enjoy the confidence of such men as J. Pierpont ("The Elder") Morgan and lesser lights of the financial world, but what is more important, he was able to obtain their support for the Menlo Park inventor at a critical time.

A close friend of Lowrey's, elected first treasurer of three pioneer Edison enterprises, including the Electric Light Company, the first New York Edison company and the Edison Company For Isolated Lighting, was Egisto P. Fabbri, partner of J. Pierpont Morgan in the firm of Drexel, Morgan & Company. Described by Lewis Corey as "an Italian financial genius," Fabbri was an asset of first order importance to the infant companies. Another friend of Lowrey's was Norvin H. Green, president of the Western Union Telegraph Company, and as such one of the principal business men of his day. Green served both the Electric Light and the first New York Edison companies as first president.

Then there was Henry Villard, a client of Lowrey's, in 1879-1883 "probably the most important railway promoter in the United States," (*) and in 1881-1884 president of the Northern Pacific Railroad and one of the most distinguished power pioneers of his day. In his earlier years Villard had won distinction as a working newspaperman, covering the Lincoln-Douglas debates, the activities of Lincoln in Illinois, and military campaigns in the Civil War. In the electrical field he won his spurs by installing aboard the S. S. Columbia, at the outset of a voyage around Cape Horn from New York to Portland, Oregon, Edison's first commercial electric light plant, built at Menlo Park. At least four times he was elected to the Edison Electric Light Company board. For nearly 10 years he was a director of the first New York Edison company, serving from its incorporation, December 17, 1880, until 1884, and from 1888 until 1893; for nearly five years he was a member of the company's executive committee. After years of service with these enterprises he turned up as founder and first president of the $12,000,000 Edison General Electric Company, in 1889.

Other pioneer directors of the early Edison enterprises during the 1880's included Edward H. Johnson, Edison's lieutenant, who had won the tribute, "There is only one Edison and Johnson is his prophet," while introducing the Edison light abroad; Francis R. Upton, Edison's mathematician at Menlo Park; Charles H. Coster and J. Hood Wright, Morgan partners who played an extremely important part in the direction of the Electric Light and New York Edison companies; Edward Dean Adams, afterward builder of the first great alternating current development at Niagara Falls; Darius O. Mills, who had founded his fortune by buying gold dust, selling goods and dealing in New York exchange as a "Forty-Niner" in California; Eugene Crowell, who was to help found the first Brooklyn Edison company; Spencer Trask, for many years president of the first New York Edison company, and many others.

In his "Menlo Park Reminiscences" Francis Jehl tells how the Edison Electric Light Company came to be formed. Impressed by the Jablochkoff "electric candle" which, during the 1878 Paris exposition, "aroused the attention of the world to the possibilities of electric illumination," Lowrey reached the conclusion that "immediate action was necessary by his friend Edison if the secret was to be found by him instead of someone else." Finding that Edison lacked funds, he swiftly organized the Edison Electric Light Company, incorporated under the laws of New York, October 15, 1878, as a means of financing an electric light research program at Menlo Park. It was the Edison Electric Light Company which provided the cash foundation for the 1878-1881 Menlo Park experiments in which Edison invented the first successful incandescent electric lamp, the first 90 per cent efficient dynamo, the first underground conductor, the first electric light meter and other elements of the world's first complete incandescent electric lighting system. It was also the Edison Electric Light Company which sponsored the formation of such pioneer electrical manufacturing enterprises as the Edison Lamp Works (lamps), Edison Machine Works (Edison "Jumbo" dynamos), Electric Tube Company (underground conductors) and Bergmann & Company (electric light accessories), which, with the parent company, found their way into the General Electric Company in 1892. Furthermore it was the Edison Electric Light Company which, through license contracts, promoted the inception of electric lighting enterprises everywhere. Expressed another way, it was the Edison Electric Light Company through which the electric lighting genius of Thomas Edison was made available to the world.

Recorded by Egisto P. Fabbri in early treasurer's reports, the Edison Electric Light Company's financial history is worth a glance. Of the company's original $300,000 capital stock, $290,000 was paid in by January 16, 1878, and all was paid in by November 11, 1879, a date which nearly coincides with that of the perfection of the lamp. Successive capital stock increases brought this total to $1,080,000 by September 24, 1883, but it is worth noting that $300,000 represented all the money used in the Menlo Park experiments which produced the first successful incandescent electric lamp and the first 90 per cent efficient dynamo, the two basic inventions of the Edison electric lighting system, and that less than three-quarters of a million dollars worth of stock was sold by the Edison Electric Light Company in financing the entire development of that system in 1878-1882. The original $300,000 capital stock was expanded as follows: from $300,000 to $480,000 on November 30, 1880; from $480,000 to $720,000 on January 31, 1882, and from

(*Continued on page* 524)

* Dictionary of American Biography.

Final Plans and Complete Program of the Fourth National Accounting Conference

THE detailed program of the Fourth National Accounting Conference, to be held at Detroit December 2, 3 and 4, as now completed and announced by the joint AGA-EEI Planning Committee, and the enthusiastic response already accorded advance announcements by accountants of the gas and electric companies, have further assured a meeting that will surpass in interest and real accomplishment even its predecessors of the past three years. Sessions will begin Monday morning, December 2, at the Book-Cadillac Hotel and continue through Wednesday, December 4.

Both the general sessions and the specialized group meetings have been planned to afford full and rounded consideration of every aspect of utility accounting under the conditions of today and tomorrow. Costs, particularly accounting costs, continue to rise and the whole-hearted enlistment of the gas and electric industries in the national defense program brings new responsibilities to accountants in the coordinated effort to utilize plant and resources with the highest possible efficiency and economy. Throughout their months of preparation, the Planning Committee, under the co-chairmanship of F. B. Flahive, of the American Gas Association, and B. S. Rodey, Jr., representing the Edison Electric Institute, have kept this national situation in mind. Speakers and subjects, especially those for the general sessions, have been chosen accordingly. All proceedings of the conference itself will be under the joint direction of E. N. Keller and Granville Bourne, leaders of accounting activities for the AGA and EEI respectively.

Two-thirds of the time of this year's conference has been allotted to meetings of the specialized groups dealing with individual phases of accounting. These group meetings will occupy all of Monday, December 2, and the afternoons of Tuesday and Wednesday. General sessions will be held Tuesday and Wednesday mornings, and there will be an informal dinner Tuesday evening, with special entertainment and a brief speaking program. Some of the groups have also arranged special luncheon conferences.

HIGH SPOTS CONFERENCE PROGRAM

GENERAL SESSIONS

Depreciation Committee Activities ..... **Hasbrouck**
Basic Concepts of Property Accounting ..... **Paton**
The Excess Profits Tax Law ..... **Berry**
An Evaluation of Customer Attitudes ..... **Eddy**
Survival Values ..... **Magoun**
Americanism ..... **Durfee**
Accounting Aspects of Rate Analysis Technique ..... **Newton**
Functional Accounting and Simplification of Internal Reports ..... **Spacek**
Regulatory Aspects of Depreciation ..... **Smith**
Has Management Benefited from Original Cost Requirements? ..... **Goetz**
Closing Remarks ..... **Young**

GROUP MEETINGS

Increased emphasis is being placed on the programs of the specialized groups this year. Two-thirds of the time of the conference has been reserved for them, and the group chairmen will encourage open-forum discussion of the subjects presented.

INFORMAL DINNER

Book-Cadillac Hotel
Grand Ballroom

Tuesday, December 3
6:45 P. M.

Toastmaster:
Major Alexander Forward

Representing the Associations:
Major Thomas J. Strickler
Colonel Howard S. Bennion

Guest Speaker:
Dean John T. Madden
"Accounting Eugenics"

Specialized Group Meetings

With one or two exceptions, the accounting committees of the EEI have been grouped with the corresponding AGA committees for the specialized meetings. These groups are as follows:

Customer Activities
Materials and Supplies
Plant Records
Taxes
General Accounting Matters
Depreciation Accounting

The general plan for conduct of the meetings is that each presentation of a paper will be followed by an open-forum discussion on the subject presented. Ample time has been set aside for these discussions, and it is hoped that every accountant present will take advantage of the opportunity thus afforded to contribute whatever of value his judgment and experience make available. Although the program for each session will be completed within the scheduled time, consideration of any subject that arouses unusual interest will be continued in following sessions.

For details of the group programs, attention is directed to the following pages. Except for a few organization meetings, all group meetings are open, and everyone registered for the conference is cordially invited to attend.

First General Session—Tuesday Morning

The first general session of the conference will begin promptly at 9:30 Tuesday morning, with Co-Chairman E. N. Keller presiding, and will adjourn at 12:30 p.m. Proceedings will open with an address of welcome by Mr. A. C. Marshall, president of The Detroit Edison Company, which, with the Michigan Consolidated Gas Company, is host to the conference.

Mr. Marshall will be followed on the rostrum by Mr. H. C. Hasbrouck, who has undertaken the heroic task of summarizing in ten minutes the recent accomplishments of the Depreciation committees of both associations. Depreciation will receive a more extensive airing from the next speaker, Professor W. A. Paton, of the University of Michigan,

well-known as the author of authoritative textbooks on accounting. He will present the academic viewpoint on the subject.

That most recent Chinese puzzle of national legislation, the Excess Profits Tax law, will be discussed by tax consultant Raymond H. Berry, of the firm of Berry and Stevens, Detroit. Mr. P. E. Eddy, assistant to the vice-president, Peoples Gas Light and Coke Company, Chicago, will speak on "An Evaluation of Customer Attitudes." Dr. F. Alexander Magoun, associate professor of Human Relations, Massachusetts Institute of Technology, will demonstrate that collaboration is the *sine qua non* in the most fundamental of all human problems, survival. Mr. E. P. Durfee, of the National Safety Council, will close the program for this session with a straightforward talk on "Americanism."

Second General Session—Wednesday Morning

Co-Chairman G. H. Bourne will call the second general session to order at 9:30 a.m. Wednesday. The delegates will be greeted by Mr. John W. Batten, vice-president, Michigan Consolidated Gas Company.

Mr. F. A. Newton, chairman, EEI Rate Research Committee, will discuss "Accounting Aspects of Rate Analysis Technique." Functional Accounting and the simplification of internal reports will be the subject of a recognized authority in the field, Mr. Leonard P. Spacek. Depreciation makes its third appearance under the conference spotlight when the Hon. Nelson Lee Smith, chairman, Public Service Commission of New Hampshire, speaks on "Regulatory Aspects of Depreciation." The subject of the next address presents a question that has been asked and answered in divers ways in accounting gatherings of recent years. It is: "Has Management Benefited from Original Cost Requirements?" and the speaker is Mr. J. H. Goetz, eminent as a lawyer and an expert in the field of rate regulations.

It is fitting that the program of this second general session should close with an address by the man who is widely acknowledged as the dean of utility accountants. Mr. P. S. Young, chairman of the executive committee of the Public Service Electric and Gas Company, can cast on present-day problems the light of half a century of experience, covering virtually the entire period of greatest growth of the public utilities. He has been prominent for many years in the association work of both the gas and electric industries. He served as president and treasurer of the National Commercial Gas Association, predecessor of the American Gas Association, and has been a moving force in the Edison Electric Institute since its founding.

GENERAL INFORMATION

The registration desk located adjacent to the Ballroom will be open on Sunday from 1 p. m., and on Monday, Tuesday and Wednesday from 8.30 in the morning until the close of the sessions each day. Conference registration: Two dollars.

* * *

Tickets for the luncheon conferences Tuesday noon and the informal dinner on Tuesday evening may be obtained opposite the registration desk. All those attending the Conference are welcome.

* * *

The Conference office, located in Parlor "D," fourth floor, will be open during the business hours of the Conference.

* * *

All those planning to attend the Conference are advised to make early reservations with the hotel.

Informal Dinner—Tuesday Evening

At last year's conference in Chicago the dinner was acclaimed one of the most popular events on the program. The Planning Committee has devoted every effort to equal or surpass that precedent, and the program arranged makes this year's affair a "must" item for everyone. With Major Alexander Forward, managing director of the American Gas Association, presiding as toastmaster, the talks will be brief but stimulating, and as an extra attraction, an entertainment program has been added. Indications are that The Detroit Edison Company Glee Club will provide a star act.

Major T. J. Strickler, newly-elected president of the American Gas Association, will extend greetings to the delegates on behalf of his organization. The Edison Electric Institute will be represented in a corresponding role by Col. H. S. Bennion, vice-president and managing director.

The guest speaker of the evening will be Dean John T. Madden, of New York University, who has a reputation for delivering solidly thoughtful messages in a sparkling manner. His announced subject, "Accounting Eugenics," promises an original treatment of the matter of the heavy hand of past accounting practices in relation to those of the present and the future.

Promotional Material to Encourage use of New Thin-Wall Wires Ready Soon

THE Wiring Committee of the EEI, at a meeting on Nov. 7, made further plans to prepare promotional material useful to member companies in promoting the use of the new thin-wall wires for Commercial and Industrial rewiring.

Small demonstration kits containing about a dozen bundles of short samples of the new wire in various of the more commonly used combinations, representing allowable conduit fill in ½ inch and ¾ inch conduits, are in process of preparation. Each bundle in the kit is labeled to show the maximum wattage capacity of such a combination of conductors, based on a stated length of circuit such as to hold the voltage drop within acceptable limits.

Accompanying each kit will be an explanatory pamphlet which will be available to the utility salesman, engineer or architect in selecting proper thin-wall conductors for a given job. The kits are expected to be ready for distribution shortly after the first of the year.

This sample kit will be a valuable tool for utility representatives to use in helping to promote rewiring which has been made economically practical with the introduction of the new thin-wall wires.

Many companies have already availed themselves of the Commercial Rewiring Presentation, consisting of kodachrome slides and accompanying script, which was prepared by the Wiring Committee and made available through EEI last year.

As a new activity this year, the Committee will develop a series of inexpensive direct mail pieces addressed to building owners and calling attention to the opportunities afforded by the new thin-wall wires to rehabilitate economically buildings long in need of more adequate electrical facilities. This advertising material will not be available for some time, but in the meantime the material which the manufacturers have made available may well be utilized to continue stimulation of interest in the rewiring of Commercial and Industrial buildings.

PROGRAM

Fourth National Accounting Conference

American Gas Association - - Edison Electric Institute

Book-Cadillac Hotel, Detroit, Michigan

December 2, 3, 4, 1940

GENERAL SESSIONS

TUESDAY MORNING, DEC. 3, 9:30 A.M.

E. N. KELLER, *Presiding*
G. H. BOURNE, *Co-Chairman*

Opening Remarks
E. N. KELLER, Chairman, Accounting Section, AGA

Address of Welcome
A. C. MARSHALL, President, The Detroit Edison Co.

Depreciation Committee Activities
H. C. HASBROUCK, Chairman, Depreciation Accounting Committee, AGA

Basic Concepts of Property Accounting
W. A. PATON, Professor of Accounting, University of Michigan

The Excess Profits Tax Law
RAYMOND H. BERRY, Berry & Stevens, Detroit, Michigan

An Evaluation of Customer Attitudes
P. E. EDDY, Asst. to Vice-Pres., Peoples Gas Light & Coke Co.

Survival Values
F. ALEXANDER MAGOUN, Associate Professor of Human Relations, Massachusetts Institute of Technology

Americanism
E. P. DURFEE, National Safety Council

WEDNESDAY MORNING, DEC. 4, 9:30 A.M.

G. H. BOURNE, *Presiding*
E. N. KELLER, *Co-Chairman*

Opening Remarks
G. H. BOURNE, Chairman, Accounting Executive Committee, EEI

Greetings to Accounting Delegates
JOHN W. BATTEN, Vice-President, Michigan Consolidated Gas Co.

Accounting Aspects of Rate Analysis Technique
F. A. NEWTON, Chairman, Rate Research Committee, EEI

Functional Accounting and Simplification of Internal Reports
L. P. SPACEK, Arthur Anderson & Co., Chicago, Ill.

Regulatory Aspects of Depreciation
HON. NELSON LEE SMITH, Chairman, Public Service Commission of New Hampshire

Has Management Benefited from Original Cost Requirements?
J. H. GOETZ, Whitman, Ransom, Coulson and Goetz, New York

Closing Remarks
P. S. YOUNG, Chairman, Executive Committee Public Service Electric & Gas Co.

SPECIALIZED GROUP ACTIVITIES

GENERAL ACCOUNTING GROUP

Classification of Accounts, Committee, EEI, A. M. HARTOGENSIS, *Chairman*
Other General Acctg Activities, AGA, O. H. RITENOUR, *Chairman*

Monday, 10:00 A.M.—Open Group Meeting

Problems of Uniform Classification in System Companies
N. W. HAIGHT, Columbia Engineering Corp.
New Uniform System of Accounts
R. B. CURRAN, The Connecticut Power Co.
More About Plant Acquisition Adjustments
C. E. PACKMAN, Middle West Service Co.
Relating Promotional Costs to Results
EDWIN VENNARD, Middle West Service Co.

Monday, 2:00 P.M.—Open Group Meeting

Putting the System of Accounts to Work
L. C. JEWETT, Arkansas Power & Light Co.
Can Benefits Be Derived by Classifying Operating Revenues?
F. P. CLARK, Kansas City Power & Light Co.
Discussion of Committee Report on Allocation of Expenses in Combination Utility Accounting
Problems Relating to the Capitalization of Overheads
W. F. R. MÜNNICH, Philadelphia Electric Co.
Budgetary Control
A. A. TALMADGE, Ebasco Services, Inc.

GENERAL ACCOUNTING GROUP (Continued)

Classification of Accounts Committee, EEI, A. M. HARTOGENSIS, *Chairman*
Materials and Supplies Committee, AGA, W. F. R. MÜNNICH, *Chairman*
Other General Acctg Activities, AGA, O. H. RITENOUR, *Chairman*
Purchasing, Stores and Transportation Committee, EEI, G. MCDOUGALL, *Chairman*
Taxation Accounting Committee, AGA, R. M. CAMPBELL, *Chairman*

Tuesday, 2:00 P.M.—Open Group Meeting

"Accounting for Materials and Supplies with Mechanical Equipment" (A short motion picture review by Consolidated Edison Co.), followed by a review and discussion of machine accounting methods (Detroit Edison Co.). Presented by G. MCDOUGALL, Consolidated Edison Co. of N. Y., Inc.; K. C. CAMPBELL, The Detroit Edison Co.; WALTER BERGMAN, Consolidated Edison Co. of N. Y., Inc.

Explanation of Machine Applications to Various Types of General Accounting, such as: transportation, payroll, material distribution, accounts payable and other general ledger systems. These applications will be explained by experts in these respective fields and this program will be under the sponsorship of A. M. HARTOGENSIS, ARTHUR SKELTON and O. H. RITENOUR.

MATERIALS AND SUPPLIES GROUP

Materials and Supplies Committee, AGA, W. F. R. MÜNNICH, *Chairman*
Purchasing, Stores and Transportation Committee, EEI, G. MCDOUGALL, *Chairman*

Monday, 10:00 A.M.—Open Group Meeting

Inventory Control and Simplification of Inventory Procedures
Accounting for Minor (Exempt) Materials Used by Gas Department and for Electric Line Construction
Replies to Questionnaire
Accounting for Reels, Drums and Containers
Maintaining Purchasing Department Price Records
(1) For Buyers' Use
(2) For Price Approval of Invoices
The Traffic Division as a Function of the Purchasing Department

Monday, 2:00 P.M.

Visit to the storerooms of The Detroit Edison Company

Tuesday, 2:00 P.M.

Joint Meeting with General Accounting Group.....Crystal Ballroom

TAXES GROUP

Taxation Accounting Committee, R. M. CAMPBELL, *Chairman*

Monday, 10:00 A.M.—Closed Group Meeting

Monday, 2:00 P.M.—Open Group Meeting

SUBJECTS:

Summary of First and Second Revenue Acts of 1940

Excess-Profits Tax Imposed by the Second Revenue Act of 1940

(1) Excess-Profits Net Income
(a) Under Income; (b) Invested Capital

(2) Excess-Profits Credit
(a) Based on Income; (b) Based on Invested Capital

PLANT RECORDS GROUP

Plant Accounting and Records Committee, EEI, H. B. HARDWICK, *Chairman*

Property Records Committee, AGA, E. F. WRESSELL, *Chairman*

Monday, 10:00 A.M.—Separate Organization Meeting of Each Committee—Closed Sessions

12:30 P.M.—Closed Luncheon Meeting

Luncheon for members of both AGA and EEI committees

2:00 P.M.—Closed Group Meeting

Informal open-forum discussion of the problems encountered, solutions found, and various aspects of the following subjects:

Determination of Original Cost, Reclassification of Plant Accounts and Filing of Reports with Federal Power Commission and State Regulatory Commissions Pursuant to Plant Instruction 2-D.

Determination and Disposition of Plant Acquisition Adjustment Accounts — the triple "A" problem of utility plant reclassification.

Reconciliation of plant records to physical property—the need for it, how to do it, when to do it and how often, and probable cost.

Determination and allocation of construction overheads—what to include, how to arrive at proportions of salaries and expenses, and methods of allocating charges to construction work in progress.

Tuesday, 2:00 P.M.—Open Group Meeting

Informal open-forum discussion of the various phases of the following subjects:

Perpetuation of original costs and plant reclassifications
With detail continuing unit property records
Without detail continuing unit property records

Original Cost Requirements
M. W. VAN SCOYOC, Chief, Division of Original Cost, Bureau of Accounts, Finance & Rates, Federal Power Commission

Simplified Unit Property Records

Continuing Unit Property Record

Methods of Reporting Payroll, Material and Expense Charges Applicable to Construction and Retirement Work in Progress

Record of Property Units

CUSTOMERS' ACTIVITIES GROUP

Customers' Relations, Commercial Accounting & Collections Committee, EEI, L. A. MAYO, *Chairman*

Customers' Relations Committee, AGA, HARRY JEFFS, *Chairman*

Customer Accounting Committee, AGA, D. E. MALONEY, *Chairman*

Customer Collections Committee, AGA, HAROLD QUAD, *Chairman*

Monday, 10:00 A.M.—Open Group Meeting

Service Sampling
C. L. SULLIVAN, Peoples Gas Light & Coke Co.

Are Lenient Collection Policies Profitable?
J. A. WILLIAMS, Niagara Hudson Power Corp.

Evaluating the Office Training Program
G. B. WEBBER, Public Service Electric & Gas Co.

Monday, 2:00 P.M.—Open Group Meeting

Customers' Accounting Under the Alphabetic-Numeric Electric Tabulating Card Plan
A. W. FYFE, Consolidated Edison Company of N. Y., Inc.

Mechanization of Cash Receipts
D. C. DAUBMEYER, The Detroit Edison Company.

Tuesday, 12:30 P.M.—Open Individual Luncheon Meetings

Three separate meetings will begin with luncheons, to be followed by informal discussions of subjects pertaining to each group.

You are urged to buy your luncheon conference tickets when you register so that reservations may be made.

Credit and Collections
Discussion Leader—W. D. DYER, Boston Edison Company
Improving collections by analyzing paying habits
Planning field collection schedules
Reduction of collection costs. What is being done?
Collection of final bills
Training Collection Personnel — Office and Field.

Customer Accounting
Discussion Leader—A. W. FYFE, Consolidated Edison Co. of N. Y., Inc.
Accounting problems resulting from national emergency.
Reduction of customer accounting costs. What is being done?
Meter reading on punch cards.
Meter reading routes and suburban growth.
New developments—billing and accounting system.

Customer Relations
Discussion Leader—W. G. MURFIT, The Philadelphia Gas Works Co.
The national emergency—effect on customer relation practices.
Successful methods of analyzing complaints.
Service sampling — objectives and results.
Billing practices and building good will.
Trends in contact employee training.

Wednesday Afternoon

This period has been set aside to give members an opportunity to visit the electric and gas companies in Detroit and other points of interest.

DEPRECIATION ACCOUNTING GROUP

Depreciation Committee, EEI, H. L. GRUEHN, *Chairman*

Depreciation Accounting Committee, AGA, H. C. HASBROUCK, *Chairman*

Monday, 2:00 P.M.—Closed Group Meeting

Tuesday, 2:00 P.M.—Open Group Meeting

Depreciation Progress in the Making
H. L. GRUEHM, Consolidated Gas Electric Light and Power Co. of Baltimore.

Plans of the Engineering Subcommittee
M. D. HOOVEN, Public Service Electric & Gas Co.

What Can and What Cannot Be Measured in Respect to Depreciation
MAURICE R. SCHARFF, Consulting Engineer

Interest as a Factor in Depreciation
A. W. HASTINGS, Engineers Public Service Co.

Formula for Estimating Service Life and Some Characteristics of Depreciation
P. H. JEYNES, Public Service Electric & Gas Co.

Some Aspects of Straight-line Depreciation
W. B. CARR, Buffalo Niagara & Eastern Power Corp.

Progress in Establishing a Depreciation Service Index
ALEXANDER MAXWELL, Edison Electric Institute

Practical Aspects of Depreciation

Summation and Conclusion
H. C. HASBROUCK, Utility Management Corp.

INFORMAL DINNER

Tuesday Evening, 6:45 P.M., Promptly

TOASTMASTER

MAJOR ALEXANDER FORWARD, Managing Director, American Gas Association

ASSOCIATION GREETINGS

MAJOR T. J. STRICKLER, President, American Gas Association

COLONEL H. S. BENNION, Vice President and Managing Director, Edison Electric Institute

GUEST SPEAKER

DEAN JOHN T. MADDEN, School of Commerce, Accounts and Finance, New York University

---

ENTERTAINMENT

FOR "IN-BETWEEN" TIME

Detroit Edison Company and the Michigan Consolidated Gas Company will hold open-house for delegates to the Conference and all are cordially invited to inspect their plants.

Tours will be conducted to Greenfield Village and other points of interest in Detroit. For schedules and other details inquire at the Registration Desk.

George Bruce Cortelyou

GEORGE BRUCE CORTELYOU, last president of the National Electric Light Association and first president of the Edison Electric Institute, died on October 23, 1940, full of years, of good works, and of honors.

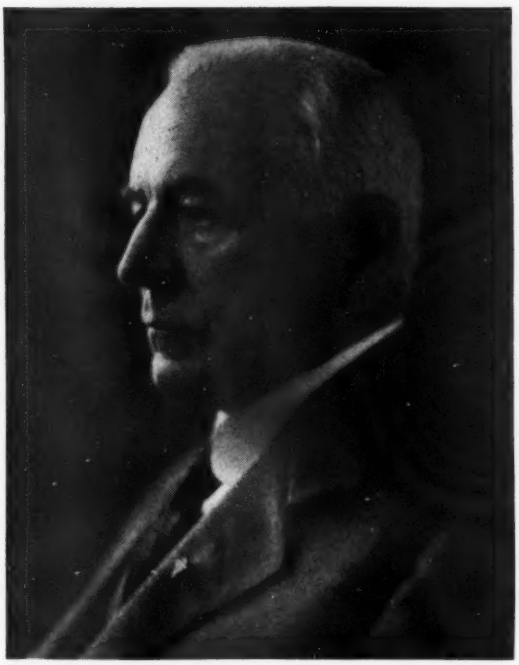
The Edison Electric Institute and the whole electric industry are the richer for his service as president during the Institute's formative period when he was at the peak of mellow experience and maturity of judgment. To every job that he undertook he gave whole-heartedly of his time and his abilities. No detail was ever too trivial for his attention, no problem too big for a forthright, honest decision. His advice was sound, sincere and given invariably with understanding and friendliness. In the most literal sense he had the respect and the affection of those with whom he came in touch.

None knew better than Mr. Cortelyou that good achievements come the hard way through determination and work, none saw more clearly the impediments to be surmounted, none saw more straight the goal.

The honors accorded him were the reward of natural ability and more than average industriousness fortified by his belief and reliance in the old virtues of courage, honesty and common sense.

Among his first words to the National Electric Light Association was an affirmation of belief: "I have great faith in the old virtues, that trinity of shining virtues so needed by our people, so needed by every industry—courage, honesty and common sense."

Among his last, on his retirement from the presidency of the Institute, was an expression of confidence: "Whatever the obstacles in our path—and they are indeed serious—we shall go forward with resolute determination to make the industry as great in leadership as it is in technical strength, to promote the widest possible use of its service at the least possible cost to every class of consumer, doing our work as well as we know how, striving always for improvement."



GEORGE BRUCE CORTELYOU

Mr. Cortelyou was born in New York City on July 26, 1862, the son of a type-founder, Peter Crolius Cortelyou. His ancestors took a leading part in the colonial and Revolutionary history of New York State. George Cortelyou graduated from the Hempstead, L. I., Institute in 1879 and from the State Normal School at Westfield, Mass., in 1882. An early love for music led him to enter the New England Conservatory of Music in Boston. He tutored for a time in the Cambridge, Mass., High School, then returned to New York to continue the study of music.

He chose stenography as a means of making a living, and got a job in the office of the appraiser of the Port of New York by winning in a competitive examination over thirty other applicants. When there was a change of administration in 1885 young Cortelyou resigned to become a general law and verbatim reporter. A few months later he was appointed principal of the preparatory schools in New York and held this post until 1889.

In that year he became private secretary to the Post Office Inspector at New York. In July of 1891 he went to Washington as private secretary to the Fourth Assistant Postmaster-General. The real start of his political career, however, came in 1893 when Grover Cleveland became President and selected Mr. Cortelyou as his stenographer and confidential clerk. President McKinley retained the young man, made him an assistant secretary in 1898 and full secretary to the President in 1900. He became an important figure in the administration, close friend and counselor to Mr. McKinley.

Mr. Cortelyou came more dramatically to the public notice when President McKinley was assassinated in September, 1901, and for a short but important period a great deal of Government responsibility fell on the secretary's shoulders. The new President, Theodore Roosevelt, asked Mr. Cortelyou to remain as his secretary and was so impressed by his ability that in 1903 he appointed him to the Cabinet as Secretary of the newly created Department of Commerce and Labor. In 1904 Mr. Cortelyou was appointed chairman of the Republican National Committee and successfully managed Mr. Roosevelt's campaign for re-election.

From 1905 to 1907 he was Postmaster-General and for the following two years was Secretary of the Treasury. At the very beginning of his tenure of this last political post Mr. Cortelyou was faced with the great financial crisis of 1907. The initiative and ability he displayed during that period in handling the Government finances and coordinating the efforts of business men brought him high commendation from President Roosevelt. At the conclusion of the administration Mr. Cortelyou's ability had become so well recognized that he received offers of a number of important and lucrative positions in banking. He preferred the utility field, however, and in February of 1909 he assumed the duties of president of the Consolidated Gas Company.

At that time the corporation had assets of about $332,000,000 and 10,000 employees. When he retired, 26 years

later, the assets were $1,300,000,000 and some 45,000 employees.

In addition to his early education in New York, Mr. Cortelyou studied law at Georgetown University in Washington, graduating with the degree of LL.B. in 1895. The following year he received a degree of LL.M. from Columbian (now George Washington) University Law School. In later years he received honorary degrees from Georgetown University, Kentucky Wesleyan University, University of Illinois and George Washington University.

In 1918 he became the first president of the American Gas Association. In 1932 he was elected president of the National Electric Association and when, in 1933, the NELA was succeeded by the Edison Electric Institute, he was elected president of the new organization. Thus he was the only man ever to head the national organizations of both the electric and gas industries.

Throughout his life Mr. Cortelyou remained a devotee of music. He was a vice-president and trustee of the New England Conservatory of Music. While he was president of the Consolidated Gas Company the Edison building was built at Fourteenth Street and Irving Place, on the site of the old Academy of Music. Mr. Cortelyou took a sentimental interest in supervising arrangements for the last concert in the historic building.

He was a director of the New York Life Insurance Company and of the D. Appleton-Century Company, president of the McKinley National Memorial Association, and the Miriam Osborn Memorial Home Association, and a member of the National Civic Federation, Merchants Association of New York, the Metropolitan Museum of Art, the Holland Society and the Navy League.

On September 15, 1888, Mr. Cortelyou was married to Lily Morris Hinds, whose father, Dr. Ephraim Hinds, was principal of the Hempstead, L. I., Institute. Five children were born to them: George B. Cortelyou, Jr., of New York City; William Winthrop Cortelyou, of Baldwin, Long Island; Helen Cortelyou (deceased), Mrs. Jacob F. Weintz (Grace Cortelyou), of Mt. Vernon, New York; and Peter Crolius Cortelyou, of Port Henry, N. Y.

Funeral services for Mr. Cortelyou were held at St. John's Protestant Episcopal Church, Huntington, Long Island, on October 25. Among the hundreds of mourners were many men and women prominent in national affairs and in the Public Utility Industry.

TRIBUTES TO MR. CORTELYOU

"Mr. Cortelyou was a valuable and valued public servant no less in the field of American business than in the distinguished public offices which he filled so ably. He brought to the presidency of Consolidated Gas Company . . . a broad experience, a mature judgment and a splended human quality. During the 26 years in which he was chief executive officer of the companies in this public utility group he had the respect and the warm affection of the many thousands who worked with him. His death brings a sense of personal loss to all of us who were privileged to be his associates."—*Floyd L. Carlisle*, chairman of the board, Consolidated Edison Company of New York, Inc.

* * *

"Back of this doggedness and energy that drove Mr. Cortelyou to success were the self-discipline, the high sense of duty and the stern belief in the practical value of such elemental virtues as self-reliance, hard work and responsibility. Mr. Cortelyou belonged to the old school of Americans . . . To those who worked with him and knew him . . . he stood out as a man of rare distinction of character, gentleness of spirit and high sense of civic duty. Never vain, never self-seeking, never ostentatious, he was an American of whom the nation as well as his family and friends can be justly proud."—*New York Herald Tribune.*

* * *

"He had a great capacity for hard work, an efficiency and adaptability that made him equal to the duties of any post to which he was called. . . . It was his mark from the first to do a good job. . . . Ike Hoover called him 'best secretary to the President.' At any rate, he was a competent and an accomplished one. He had the advantage of a distinguished appearance. Otherwise he was the son of his own works, owing nothing to 'influence.'"—*New York Times.*

* * *

"In his death the country has lost one of its most distinguished and honorable citizens, and the Greater New York Safety Council and the Museum of Safety have lost one of the best friends and workers that safety ever had."—*Frank L. Jones*, president, Greater New York Safety Council.

Two Utility Companies Publicize Northwest in New Book

THE resources and productivity of the Pacific Northwest are portrayed in *River of the West, A Story of Opportunity in the Columbia Empire*, a 48-page, handsomely bound and illustrated book published recently by Northwestern Electric Company and Pacific Power and Light Company, operating companies of the Electric Bond and Share group which serve large areas of Washington and Oregon.

The text, written by Robert Ormond Case, traces the development of what was once known as "the Oregon country" from the original pioneer settlements to the present, emphasizing the central role played by the Columbia River. This historical portion of the story is illustrated by reproductions of the murals adorning Oregon's new capital. There follows a full account of the agriculture, industry and commerce of the region, with colored pictorial charts depicting its importance in the national economy and many excellent photographs of Northwestern scenery and activities.

In a foreword to the book Paul B. McKee, president, Pacific Power and Light Company, and L. T. Merwin, president, Northwestern Electric Company, invite attention to the sections served by the two companies and offer the services of their industrial engineers to those who are interested.

Cost of Electricity for Homes Is Less Than Beer and Tobacco Taxes

THE total amount paid for electricity used in American homes during the 1940 fiscal year (ended June 30) was less than the Federal taxes paid on tobacco and beer during the same period, it appears from figures recently published. A press release of the U. S. Treasury Department states the taxes collected on tobacco as $608,518,443 and those on beer and similar fermented malt liquors as $264,579,036. The total of these "luxury" taxes is over $4,000,000 more than the $868,768,000 estimated by the Edison Electric Institute as paid during the same 12 months for residential or domestic electricity by all the homes and farms of the United States.

Reddy Kilowatt—Goodwill Ambassador-at-Large for 156 Electric Companies

FOR nearly 40,000,000 people the electric service they receive is personified nowadays by a lively little cartoon character who has a light-bulb for a nose, electric receptacles in place of ears and body-lines that suggest lightning-like energy. His name—an important factor in his "personality"—is Reddy Kilowatt, Your Electrical Servant, and although he is not quite seven years old, his sponsors believe he is well on the way to becoming a universal symbol.

His sponsors, at this writing, are 156 electric utility companies operating in 44 States, the District of Columbia, Hawaii, the Philippines, Canada, Cuba, Argentina and Brazil. Serving more than 8,600,000 meters in this country alone, they represent nearly a third of the industry. Twenty-seven of them, with 1,600,000 meters, "signed up" Reddy in the first nine months of 1940, marking his greatest progress to date.

For all these companies Reddy Kilowatt is a central, animating theme not only in advertising but in virtually every aspect of customer and public relations—a sort of ambassador-at-large to the public. It is not the Electric Light and Power Company that announces a new generating plant, an improvement in service, the company's participation in a civic activity—it is Reddy Kilowatt. If a storm interrupts service, Reddy, not the company, explains ("I had a bad night of it," says Reddy, limping and bandaged, in a newspaper display ad next day, "but look how quickly the boys got me back on the job"). When rates are reduced, the customers are not told simply that the cost of electricity has come down; rather, a "slash in wages" has been cheerfully accepted by Your Electrical Servant. And—toughest assignment in customer relations—the company need no longer threaten to disconnect a user who is delinquent in paying his bill. Instead, Reddy makes a moving appeal: "Please pay up my back wages, so I can go on working for you." By his nature, Reddy can say gracefully almost everything that the company, in its own person, cannot.

> The value of a personalized approach to the customer is recognized by electric utility companies generally. Many companies have achieved this approach by effective use of their own trademarks, symbols and themes.
>
> Others—in their sum a large and prominent part of the industry—have found a common solution in the Reddy Kilowatt idea. Its widespread growth and demonstrated success make it important news in the vital field of advertising and public relations.

It was out of the servant-for-wages idea that Reddy actually was born, according to Ashton B. Collins, his originator. "The biggest obstacle to the customer's appreciation of electric utility service has always been that it couldn't be presented in the same way as any marketable commodity—because it *isn't* a commodity. Most of the companies realized that the story they had to tell was one of service, but they felt that no effective way of telling it had been found. Technical data, pictures of generating plants and statistics on miles of transmission line weren't getting the job done.

"It might be said, of course, that it is the electric company who serves the customer. But if you asked the customer to visualize the company—its president, say, or local manager, or even a composite picture of all the personnel—as lighting his home, refrigerating and cooking his food, ironing his shirts, the customer would laugh at you. And the customer would be right. Electric energy, measured in kilowatthours, is the agent—the *servant*—who does this work for the customer. The customer *hires* a kilowatt to work by the hour at *wages* of so many cents.

"What we needed was a personality, not a person, to put over this story of work for low wages by an electrical servant who is tireless, strong and always on the job. The answer is Reddy Kilowatt, Your Electrical Servant, who is one-third stronger than a horse. The story he tells has two big advantages: It's perfectly true and it is instantly accepted and understood because everybody is wage-hour-conscious these days."

The character's name has another advantage which was discovered only after it had been decided upon: the word *kilowatt*, or a close approximation having the same meaning, exists in all modern languages and every one of them has a word sounding like *ready*. This quick-recognition virtue has been important, for not only is it necessary that Reddy speak Spanish in Argentina and Portuguese in Brazil; in the United States his message goes to foreign-speaking emigrants from dozens of countries through their own newspapers.

The Philadelphia Electric Company was Reddy's first sponsor, adopting him in January, 1934. Its territory was an excellent proving ground because of the large number of customers and diversity of usage. The idea "caught on" quickly, and today Philadelphia Electric regards Reddy as one of the most valuable members of its organization. George E. Whitwell, vice-president of the company, and Clara H. Zillessen, its advertising manager, made important contributions to the development of the original idea and the operating plan of the service.

Reddy soon began to see more of the country—or, more accurately, more of the country began to see him. The Pennsylvania Power and Light Company subscribed to the service early in 1934 and was closely followed by the Ohio Edison Company and the Alabama Power Company. At the end of that first year it was being used by seven companies serving more than a million meters. The expansion was not a gradual spread outward from Philadelphia, however. Companies in widely separated sections adopted the service almost simultaneously, and additions to the list since then have come in a similar manner. Now it is literally true that Reddy works in the four corners of the nation: Seattle, San Diego, St. Petersburg and Bangor, Me. And all this growth has

taken place during seven years generally labeled "depression."

At first the new idea was applied only in advertising to residential users of electricity. But as developments crowded one another and public response became more and more enthusiastic, it became obvious to the companies that they had acquired a representative who could serve them well in all branches of advertising, promotion and public relations. The dynamic figure of Reddy began to appear in ads addressed to industrial customers and in institutional announcements to the public. In the industrial field the term "Reddy Kilowatt Power" was copyrighted for use in place of "central station power"—hard-headed factory managers, it was soon proved, were as vulnerable to Reddy's charms as were housewives.

As a cartoon figure, Reddy is no mere static trademark or symbol. He is as flexible and versatile as the service he personifies, and he is nearly always pictured in action: the electrical servant at work. His pose and costume are varied to fit the specific message. In an electric range ad he may appear in a chef's cap and apron; in an industrial ad, as an overalled factory worker. A Scottish tam and kilt lend emphasis to his news of the savings to be achieved through greater use of electricity. Just now, with public attention focused on national defense, Reddy frequently wears military uniform. A few days from now millions of pieces of advertising matter will portray him as a somewhat elfish Santa Claus, with a bag stuffed with electrical gifts. Collins estimates that Reddy has already played 5,000 roles and refuses to predict in what guise he will show up next. One unusual application appeared recently in an ad of the Oklahoma Gas and Electric Company: Reddy with his feet spread and arms held stiffly horizontal as a humanized transmission tower.

These varied applications of the Reddy Kilowatt idea are the work of the advertising departments of the subscribing companies and of the agencies serving them. The Reddy Kilowatt Service, operated by Ashton Collins with headquarters at Birmingham, also creates basic concepts for the program and acts as a clearing-house for the ideas developed all over the country. In subscribing for the service, an operating company agrees to contribute its own developments of the idea to this central pool. In return, it receives the exclusive right in its territory to the Reddy Kilowatt name and character in all the applications developed by all the companies. The Birmingham office supplies the subscribers with news of the latest developments, makes available newspaper mats of the illustrations and acts as a central purchasing agent for the astonishing number of advertising novelties that have been evolved from the central idea. The companies pay an annual fee based on the number of meters served. Collins himself modestly summarizes this collaboration by quoting the essayist Montaigne: "Other men's thoughts are my bouquet; mine is only the ribbon that binds them."

In addition to using Reddy to vitalize advertising in mediums already established, the companies have discovered that he can open entirely new approaches to customer understanding. One of the most important of these is via the monthly service bill. Reddy appears on the face of the bill to translate the technical language of kilowatthours, demand, rate blocks and total bill into the simpler terms of hours and wages. Thus for the first time accounting departments have been made an active part of the advertising and promotional team of the electric utility.

As a radio voice, Reddy gets the same sort of reception that Charlie McCarthy does. He amuses the listeners, captures their fancy, can be waggish and boastful with impunity. Here, again, his value as spokesman for the utility company is high.

Appliance advertising has been a "natural" for Reddy. He makes an attractive central figure for window displays, lends a human and dramatic touch to price tags and direct-mail pieces. His use in direct merchandising by the utilities and in cooperation with dealers is a fast-growing part of the program.

The continually widening use of the service is itself strong testimony that the public has responded favorably. But the extent and enthusiasm of customer acceptance of Reddy frequently surprises his sponsors. When the Puget Sound Power and Light Company, of Seattle, sent a delinquent notice in the form of a rhyme signed by Reddy, a remittance came in accompanied by an answering rhyme. A school teacher in Ohio answered a similar notice by urging Reddy to reciprocate by supporting a school levy so that the wages of "your educational servant" might also be paid. Indeed, many a post office dispatcher must have been momentarily puzzled by letters addressed simply "Reddy Kilowatt," for his fan mail runs to thousands of pieces a month. The Arkansas-Missouri Power Corporation exhibits the all time (to date) extreme in customer whimsy: a check for a monthly service bill, made payable to Reddy Kilowatt. But many a utility collection manager regards such phenomena as evidence of the little symbol's most valuable characteristic—the ability to "dun" a customer without losing his good will.

Children, of course, have taken Reddy to their hearts. To them—and to thousands of grown-ups—he is as "real" as Mickey Mouse, Donald Duck and Charlie McCarthy, whose esthetic kinsman he undoubtedly is. One of the earliest reactions to Reddy's appearance was a tremendous demand for his image on pins, dolls, balloons and dozens of other novelties and toys. The companies have given these away in wholesale quantities—building good relations with the electric customers of tomorrow.

How account for Reddy's popularity? Probably most of his sponsors don't care to look a gift horse in the oral cavity. But there are cynics who say it is proof that an established dictum must be revised—that advertising, formerly written for a twelve-year-old mind, should now be directed to a six-year-old mentality. Ashton Collins has a more charitable explanation. In the past decade, he says, the ordinary person has been so depressed by economic and political upheavals that he welcomes an escape to fantasy by means of such creations as Reddy. And after all, the most important consideration to the companies using Reddy Kilowatt service is that they have found an effective way to dramatize and humanize their relations with the controller of their destinies, the Public.

Pole Top Resuscitation Developments

By W. R. Smith

Chairman, Accident Prevention Committee, EEI

Presented before the National Safety Council, Public Utilities Section, Oct. 10, 1940.

IN making this report on the developments in connection with this method during the past year, I consider that I am making a progress report as the special representative of the light and power group on your Executive Committee, by virtue of my chairmanship of the EEI Accident Prevention Committee. I wish to present this to you in three aspects, as follows:

First: *Record to Date*—The experience with the Pole Top method to date.

Second: *Fundamental Considerations*—Some observations on important aspects of this method and the general subject.

Third: *Case Review Procedure—Resuscitation Review Board*—Plans for carrying forward our investigation into this whole subject of resuscitation.

(1) Record to Date

Our experience to date will need to be reported from a qualitative standpoint in large degree as complete quantitative data is not in hand at present. During the past year there has been evidence of an ever increasing interest in the Pole Top technique, there having been many inquiries for information on the method and for copies of instructions that could be used in training men. Among the companies represented on the Accident Prevention Committee, EEI, a large majority report that training in the method is being given to linemen.

From statements made to me by members of the Accident Prevention Committee and others to whom I addressed inquiry, I have information to the effect that of 34 instances in which this method has been used 25 were successful. In my own opinion these figures are below the actual ones if we had complete information at this time.

It is important at this point to report that no cases have come to my attention in which the men giving such aid have been reported to have experienced shocks themselves, and at no time have there appeared in the reports of cases any statements on the part of doctors or others that would even suggest that the victim had been bruised in any respect by the resuscitation procedure. These aspects of this matter are amplified below.

(2) Fundamental Considerations

It is unfortunate, I think, that, from the early announcements concerning the Pole Top technique there should have been formed in the mind of anyone the impression that here was some new resuscitation method that was being proposed and which might do harm to our recognized standard Schafer method. It is my impression, however, that it is now understood that in effect the principles of the Schafer method were being made available, if you will, by this technique to the unfortunate victim of shock when he was in a position where he could not quickly be placed in a prone position. And the victim does not necessarily have to be on a pole, he may be in a boiler in between tubes or in any other such position where many minutes would inevitably elapse before he could be taken to a place where he could be laid down in the conventional prone position. Let me illustrate out of actual experience.

There is already on record a gas poisoning case in which one of two victims on losing consciousness, slumped down between the edge of a bath tub and the wall in such a way that he could not be readily and quickly extricated. This individual's life was saved by an ambulance driver to whom information on this method had been imparted by an employee of one of our leading light and power companies. But the most interesting aspect of this case is that the employee had never been trained himself, being in the underground department, but had observed the training being given to linemen.

I am convinced that were it our privilege to be honored by the physical presence of Dr. Sharpey-Schafer at this time, as we always do ourselves honor in cherishing the memory of his great contribution to human welfare, he would be the first to commend such action as completely in keeping with the principles that he was advocating.

Now as to the real justification for action so prompt as is made possible by this technique on a pole. In his discussion of Mr. Oesterreich's paper last year, Dr. Cecil K. Drinker, Dean and Professor of Physiology, Harvard School of Public Health, Boston, and whom we all know for his contributions to this general field of thought, reemphasized the fundamental relationship of time to the victim's chances of being resuscitated. Up to three minutes there is little loss of ability to resume respiration and the chances are, therefore, good that efforts of resuscitation will be successful. After 12 minutes this latent ability of the individual to respond is in general gone and our hopes are gone, too. But we work on until the evidence of this is beyond all doubt and convincing.

Let us see what an examination of the EEI record shows as to the periods of time within which resuscitation was started in those cases where the Prone Pressure method was employed with success, such success having been duly attested together with all pertinent data.

I personally examined and tabulated the data from the 21 cases acted on by the Committee of Judges of the EEI Prize Awards Committee from January 1, 1938, to the present and the average of the elapsed time to the starting of resuscitation was 1½ minutes. In no case did the time of starting of resuscitation exceed three minutes. In all but five cases the time was two minutes or less. The length of time over which resuscitation had to be continued before revival was effected seemed to bear no particular relationship to the time before resuscitation.

Now what does this mean? Emphatically that the majority of the successful cases will be found to have been started within the three-minute period emphasized by Dr. Drinker.

In weighing the relative merits of the Pole Top technique and a well studied and perfected procedure for lowering the victim in the shortest possible time and performing resuscitation on the ground, it seems not amiss to direct thought to the consideration that, when the actual experience confronts us, many factors can influence the actual realization of such short periods of time for lowering, and on which we are counting strongly for success. And somehow it seems to me that all of our experience and certainly our understanding of the physiological aspects would suggest that even with such perfected lowering procedure, I would wish to give the victim

every chance and, therefore, give him aid as quickly as possible and then carry on from there. And to this point of view Dr. Drinker gave support in his comments above referred to and which I have found also to be held by Dr. H. B. Williams of Columbia and Dr. W. B. Kouwenhoven of Johns Hopkins, men also prominent in the field of scientific investigation with which we are concerned.

Returning now to the questions of danger to the rescuer and to the rescued it has not appeared to those in the light and power field who have studied this entire matter thoughtfully and who have in turn been guided by the opinions of physiologists and medical men that there is any greater cause for anxiety in this regard than in connection with many another aspect of our work. There is, it would appear, no greater risk to be run by the rescuer with safety to himself when he goes up to give Pole Top resuscitation than when he goes to make the usual rescue which involves freeing the victim from the circuit if necessary and making all arrangements for lowering him. And there is an aspect of this that it seems to me has not heretofore been stressed sufficiently. Shortly after we received our first instruction in this method from the linemen of the Philadelphia Electric Co. who had previously been instructed by the men of the Duquesne Light Company, we prepared an outline of procedure for our field forces. In order to completely relieve the rescuing group from the urge for haste which would necessarily exist if the victim's chances depended on how soon he reached the ground, we established a minimum of 50 respirations to be given to the victim before he was to be lowered. At 12 respirations per minute this gives a period of slightly over four minutes. If everything is then in readiness, and the state of the victim does not justify continuing with the Pole Top method, he is lowered. In general the time will more probably be five minutes or more, depending upon pole conditions. The advantage of this procedure in easing the strain on the men and lessening the likelihood of accident will be apparent but recently it was shown to have another very fundamental value.

Dr. Yandell Henderson of Yale, one of the leading authorities in this field of investigation, has called attention in his writings and especially in his "Adventures in Respiration" to the state defined as apnea which exists when there has been a sufficient period of over-breathing which has increased the concentration of oxygen in the blood and so diminished the concentration of carbon dioxide that the respiratory organs in the brain were not stimulated to activity. Under this state, normal breathing ceases for a brief time, presently to be resumed when the carbon dioxide concentration builds up and again produces the stimulus. When "conscious" subjects submit to artificial respiration which is efficiently performed, this period of apnea is shown in the records made of the movement of air in and out of the lungs.

In this connection I am privileged to refer to a paper which will be presented on Friday, October 11 at the Middle Eastern District Meeting of the American Institute of Electrical Engineers by Drs. W. B. Kouwenhoven, D. R. Hooker and O. R. Langworthy all of The Johns Hopkins University entitled "A Comparison of the Relative Efficiency of the Schafer and Pole Top Methods of Artificial Respiration." I shall not attempt to go into the detail of the investigation but am privileged, as a member of the Institute, of its Committee on Safety which sponsored this paper, and because of the great fundamental interest that we have in this investigation to say the following.

(1) Both the Pole Top and Schafer methods when correctly performed are shown to be efficient and the actual volume of air moved by their use in a given time is comparable to the amount that the subject would breathe under normal conditions.

(2) The time to move a given volume of air (10 liters; 1L = 1000 cu. cm.) was shown to be slightly less for the Pole Top method, which indicates the effectiveness of the Pole Top method.

At the conclusion of this paper Dr. Kouwenhoven will present a record of a Schafer Prone Pressure test which in response to my inquiry he has stated is identical in important aspects with that made on the Pole Top investigations. This record shows clearly the 15 to 20 seconds period of apnea and cessation in normal breathing following about 4½ minutes of efficiently given artificial respiration.

It is, therefore, obvious that after such a period, with all in readiness, the 15 to 20 seconds time for lowering the victim is not likely to lessen the chances of recovery. Whether or not it is desirable to lower just at that time is a matter of good judgment on the part of all concerned and it is believed that well trained men can be depended upon to do what is best. If the working conditions are bad, lowering as soon as possible is no doubt indicated. If conditions are favorable and at the expiration of the five minute period the victim is beginning to show signs of recovery, the Pole Top resuscitation might be carried on uninterruptedly for a longer period.

At all times must it be remembered that the rescuer is working in a very abnormal manner and that fatigue will come more quickly. Relief is not easily given him except by lowering the victim. I have referred above to well trained men and to resuscitation efficiently given. As we consider this matter of risk to the rescuer we should recognize that the Pole Top technique is not a procedure to be undertaken by other than trained personnel. The Accident Prevention Committee has laid emphasis on the importance of this from the beginning.

And complete training includes not only the necessary proficiency in the giving of resuscitation by the Pole Top method, but an understanding of certain fundamentals. One of these is that, when the environmental conditions are not favorable to the giving of resuscitation without serious danger to the operator, the victim should be lowered. The second is that the operator must be prepared for the period of revival and at which time the victim may become violent. If the victim's hands, arms, or legs might at such times come into contact with nearby exposed parts of the electrical system, the operator will need either to restrain the victim himself by placing his arms outside of the victim's arms, or to call on an assistant to place a line about the victim's arms.

There is no greater service than can be rendered to this whole situation by all of you men of the Public Utilities Section here assembled than by carrying forth the message that the adoption and use of this method by field forces should only be after adequate training has been received by at least one gang at the hands of those qualified to teach the method. Such a trained gang can then pass the instruction on to all the others. If I were privileged to leave only one thought with you it would be this—"adopt the Pole Top technique or not as your own system conditions and other procedure dictate, but if you do adopt it, carefully train and periodically drill your men in its principles and execution."

Pole Top resuscitation can be seriously harmed, and those men who yet live because of its performance irrevocably affected, by untoward experiences before

(*Continued on page* 512)

Voltage Drops in Radial Overhead Distribution Circuits

By W. R. Bullard
Ebasco Services, Inc.

Discussion presented at meeting of EEI Transmission & Distribution Committee, Atlanta, Georgia, October 14, 15 and 16

WHAT I have to say on the subject of voltage drops is elementary, but I am motivated by the fact that in reviewing published studies intended to assist in solving the very difficult and complicated problems of economics involved in allocating voltage drops to various elements of the distribution system, I have noted a tendency to employ simplifying assumptions that result in the omission of very weighty physical factors. My purpose, therefore, is to call attention to the complexity of the problem by illustrating the large influence that some of the factors frequently neglected have on the problem. Also, I want to emphasize the changing character of the engineering picture due to development of new practices, and to make a plea that these be taken fully into account in the studies which this committee has undertaken. In order to conserve time, I shall confine my remarks to primaries, transformers and secondaries. Voltage drops in services and customers' wiring also are important, but their effects on the problem are relatively simple, and readily amenable to calculation if the necessary basic field data can be obtained.

Starting with primaries, Fig. 1 shows a commonplace stretch of linear primary circuit. Transformers (not shown in the diagram) are assumed to be distributed along its length. The circuit and load characteristics are so selected that the difference of voltage between first and last transformer on the circuit, at peak load, is 10 per cent. With a fixed voltage at the source of the level shown, the voltage profiles are as shown in the curves, departing a maximum of only 5 per cent from the ideal value but with high voltage throughout at light load.

Fig. 2 shows the effect of adding a regulator at the source. The maximum departure from ideal is still 5 per cent, but light load conditions are better. In the next few figures, the regulator will be retained.

In Fig. 3, we add a capacitor installation at the end, sufficient to compensate for half the line voltage drop. This gives the results shown in the curves, the maximum departure from ideal now being only 2½ per cent. If load power factors are low, circuit energy losses are reduced and system capacity is released, perhaps all the way back to and including the generating station. Thus, the net cost of this measure may be zero, or there may even be an actual saving in system investment.

In Fig. 4, we remove the capacitor and install a backfeed from the center of the circuit. Assuming identical characteristics of line and load on the two halves of the circuit, the departure of voltage from ideal is only 1¼ per cent, but energy losses and pole line congestion are increased.

In Fig. 5, we remove the backfeed and install an additional regulated feeder from the source to the center point. Here also we have a 1¼ per cent departure from ideal. The energy losses are reduced, but the effect on pole line congestion is the same as in the preceding figure.

In Fig. 6, there are combined all of the measures so far discussed and the departure from ideal is reduced to 0.15 per cent.

We have assumed a primary voltage of 4 kv for all of the foregoing cases. Now let's go back to the first case of a simple, unregulated stretch of linear primary having a 5 per cent departure from ideal, and do nothing to it but change the primary voltage. Fig. 7 shows this case with a primary voltage of 13.2 kv. instead of 4 kv. The resulting departure from ideal is 0.45 per cent. Furthermore, energy losses are greatly reduced, and if the distribution system in question employs a subtransmission system of this voltage, step-down substations are eliminated. Economic studies of an appreciable number of specific situations have shown the cost of gradually applying this measure over a period of growth and development to be a negative quantity, i.e., there is an actual saving in overall costs.

Now, the point of all this is that the problem of evaluating the cost of controlling voltage spread in primary circuits involves a great deal more than counting up the cost of copper; also that existing designs and practices may be very poor indices of voltage spreads in the future. The examples given are selected solely for the purpose of illustrating these two points, and by no means do they present a complete picture. For instance, it can be pointed out that it is absurd to assume that a feeder regulator can hold voltages within some of the limits shown. That is true, but it is the other factors I am illustrating—not feeder regulator characterstics. There are other commonly employed measures of voltage control that I have not mentioned—for instance, varying the size of circuit conductors, or employing small pole-type regulators at selected points in the circuit. Of the measures mentioned in the illustrations, two have come into use on an appreciable scale, only within recent years—namely, capacitors and primary voltages above 4 kv. Yet, in many situations, they are being employed with actual savings in system investment. How would you evaluate their costs in a study of the economics of allocation of voltage drops to different system elements?

Turning to the matter of drops in transformers, we find a complicated problem that frequently is passed over by

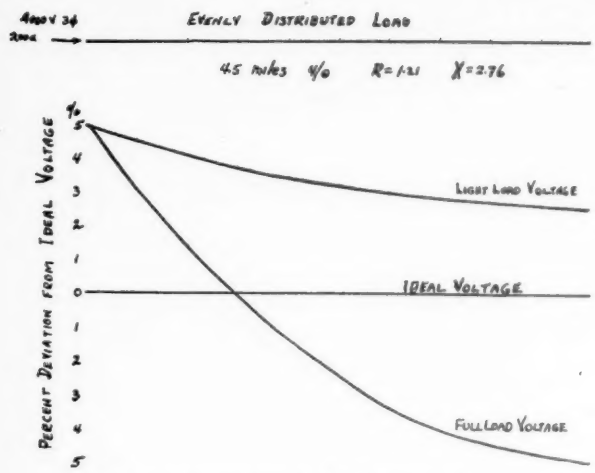


Fig. 1—Unregulated 4 Kv Primary Circuit.

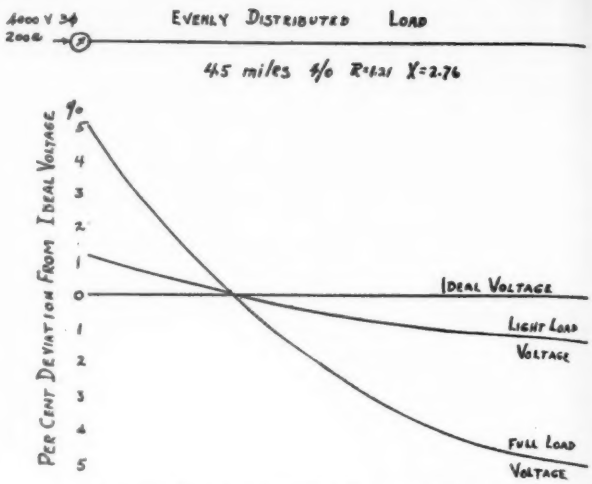


Fig. 2—Regulated 4 Kv Primary Circuit.

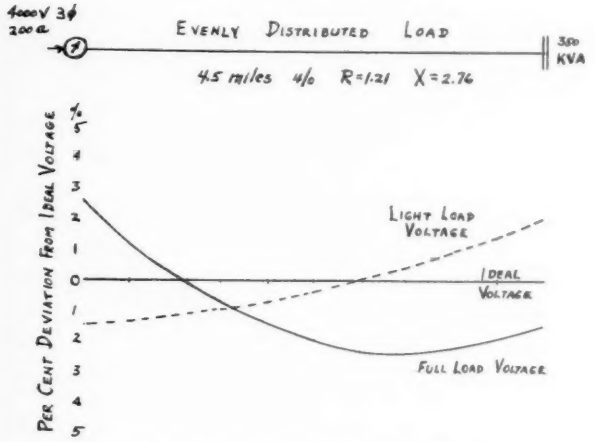


Fig. 3—Regulated 4 Kv Primary Circuit With Capacitors.

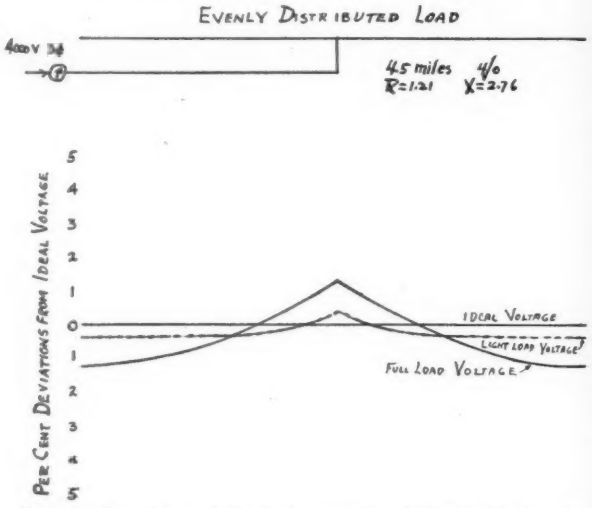


Fig. 4—Regulated 4 Kv Primary Circuit With Backfeed.

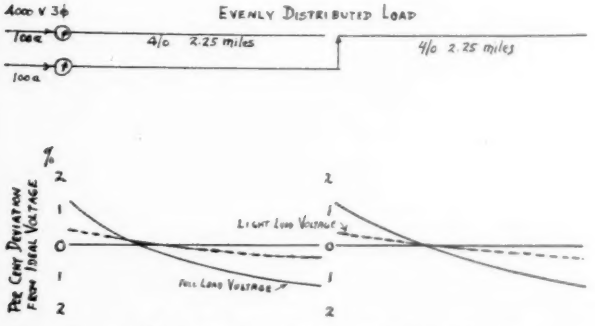


Fig. 5—Two Regulated 4 Kv Primary Circuits.

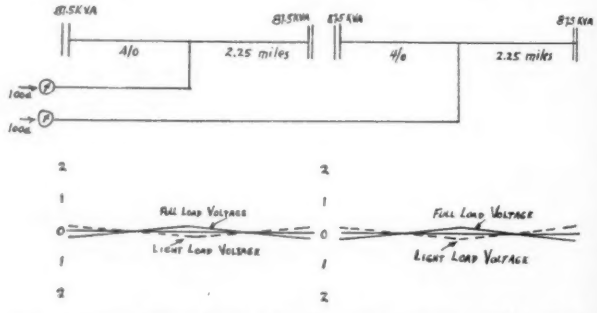


Fig. 6—Two Regulated 4 Kv Primary Circuits With Backfeeds and Capacitors.

the use of arbitrary and sometimes illogical assumptions. For instance, the transformer nearest the source may be assumed to have zero load, and the transformer farthest from the source may be assumed to have maximum permissible load, giving a resulting voltage difference equal to the drop in the highest loaded transformer. Of course, neither of these assumptions is strictly typical of field conditions. The problem is chiefly that of relative loading of individual transformers at time of circuit peak load. This is determined principally by two factors —diversity of load characteristics, and inequalities of loading as determined by location and selection of transformer size. The latter of these factors is controllable; the first mentioned is relatively uncontrollable.

Let's look at Fig. 8 and consider the case of a distribution system in which very little supervision is exercised over transformer loading. When installed,

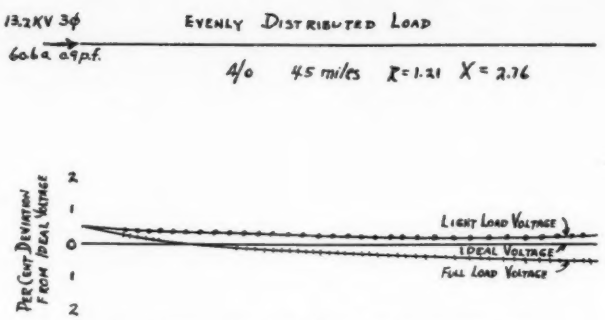


Fig. 7—Unregulated 13.2 Kv Primary Circuit.

sizes are selected largely by personal judgment. After installation, they are left largely undisturbed until poor voltage or other occurrences indicate that attention is needed. The figures in the first line can be used to illustrate possible resulting conditions. There is considerable difference between the voltage drops of Transformer A and Transformer B, these being selected units near the two ends of the circuit which have voltage difference and location such as to control the effect of transformer voltage drops on the overall spread of voltage.

Now assume a system where well organized supervision is in effect, aimed at the same average loading of transformers, regardless of their location in the circuit. Conditions such as those shown in the second line of figures might obtain. Note that the spread at time of circuit peak is considerably less.

So far, we have gone about as far in control of loading as ordinary operating practice contemplates. But why should we arbitrarily assume that that is as far as we can go? In general, the number of transformers near the source is considerably less than those on the fringes, and why should it not be practicable to load these units to higher levels on the average than the general run of units, perhaps somewhat shortening their life but materially improving the voltage situation? The situation then might conceivably be represented by the third line of figures in which the voltage spread at time of circuit peak has been cancelled entirely. This may appear startling, but is believed to be not beyond the bounds of practicability in some situations. As a matter of fact, selective loading of this general nature frequently is employed unconsciously by operating organizations, as for instance, when a transformer in service is replaced with a unit of another size to improve voltage conditions. It is

	TRANSFORMER A			TRANSFORMER B			
	*Indiv. Peak Load	Load At Time Of Circuit Peak	Voltage Drop At Circuit Peak	*Indiv. Peak Load	Load At Time Of Circuit Peak	Voltage Drop At Circuit Peak	Difference Between Voltage Drops At Circuit Peak
Minimum Supervision	25%	16%	.32%	150%	120%	2.4%	2.08%
Supervision Aimed at Equal Loading Based on Individual Peaks	100%	66%	1.32%	125%	100%	2.0%	.68%
Supervision Aimed at Very Heavy Loading of Transformer Near Source	150%	100%	2.0%	125%	100%	2.0%	0

* These are not the lowest nor the highest individual peak loads of all transformers on the circuit but are estimated possible loads near the extreme ends of the circuit which might determine the voltage spread due to transformer drops.

Fig. 8—Transformer Loading.

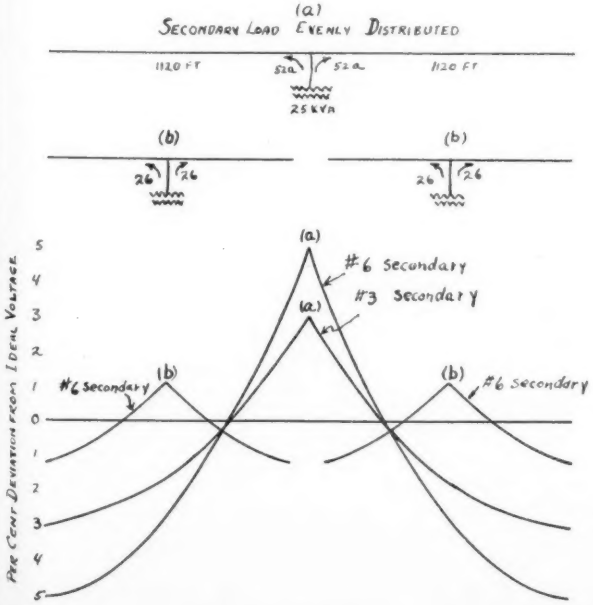


Fig. 9—Methods of Controlling Voltage Drops in Secondary Circuits.

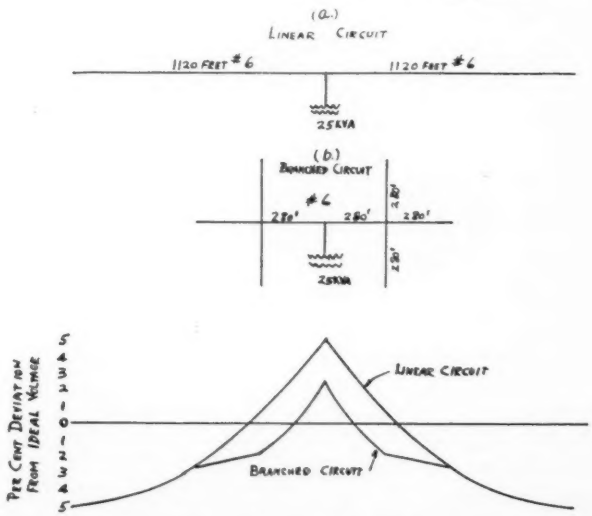


Fig. 10—Effect of Branches on Voltage Drop in Secondary Circuits.

conceivable that selective loading could be carried to the point of a negative effect on overall spread—that is, the transformer drop might partly neutralize the line drop.

These figures do not necessarily indicate the actual potentialities in any specific system. They are merely estimates used for illustration, but they should serve to call attention forcibly to the marked effect that transformer supervision may have on voltage spread. The resulting influence on the economics of voltage drop allocation, therefore, cannot be properly evaluated without delving into the costs of supervision and the intricate problem of economics of transformer loading, which is further complicated by the possibilities of selective loading here pointed out.

Coming now to secondaries and referring to Fig. 9, two commonly used methods of reducing secondary drop are illustrated: one, that of varying the size of secondary copper, and the other, that of varying the spacing of transformers. Starting with a spread of 10 per cent (5 per cent above and below the ideal value), as in diagram (a), doubling the size of copper reduces the departure from ideal to 3 per cent, as shown in the curves. Going back to the original size of copper, but doubling the number of transformers, as in diagram (b), gives a departure of 1¼ per cent from ideal, as indicated in the curves. Both of these measures are commonly used, but their costs are different and their effects are different. For a given voltage spread actually allocated to secondary drop, the economics of the picture are determined largely by balancing the costs of varying numbers of transformers and primary branches to feed them against the costs of varying sizes of secondary copper.

In all of my discussion so far I have used for illustration linear unbranched circuits. This is done very commonly in studies of voltage allocation. However it is based on a simplifying assumption that may lead the investigator very far afield. Distribution systems generally, of course, are two-dimensional. That is, they serve an area of interlaced streets and not a single street. The effect of circuit branching that is introduced by this two-dimensional characteristic may be very important. For instance, referring to Fig. 10, the two diagrams are drawn with the same assumptions as to total circuit length, load density, and circuit characteristics, except that in one the circuit is linear and in the other, it is branched. The voltage drops differ in ratio 2 to 1, indicating that it is not safe to base generalized studies on the assumption of linear circuits.

In a series of articles in the *Electrical World* during the early part of the year 1928, the writer developed an empirical method of including the effect of branches in handling mathematically the economics of transformer spacings, secondary conductor sizes, etc. A glance at these articles will serve to emphasize the complexity of the subject.

I shall not take the time to go into other methods of control of secondary voltage drops such, for instance, as the use of interconnected secondaries, i.e., banked transformers. Having mentioned this method, however, I may say that it is another practice that is just coming into appreciably general acceptance, and is another indicator of the fact that the engineering picture is changing rapidly.

If, in this discussion, I have brought forcibly to your attention the need for considering all factors involved and being suspicious of arbitrary simplifying assumptions commonly used, also the need for looking into the future as opposed to acceptance of designs and practices existing today, my purpose will have been served.

Pole Top Resuscitation Developments

(*Continued from page* 508)

this matter has been firmly established by data of a more comprehensive character.

The Schafer Prone Pressure method stands today in a position where it is not affected by any of these considerations. Pole Top is making its way. Let there be no stumbling blocks cast in its path by any uninformed and untrained groups or individuals when there is information and instruction to be had for the asking at the hands of those who have the knowledge and the experience.

As concerns any likelihood of injury to the victim by the technique it is my opinion that this is no greater if as great as the danger from the Prone Pressure method, all conditions being equal. Dr. Drinker mentioned this aspect of the matter in his comments last year, especially with regard to the condition when a powerful man works on a relatively thin one over a long period of time, but gave it as his opinion that injury was unlikely, especially within the length of time that such resuscitation would be given and which would probably not exceed 10 minutes.

During recent years we have noted the emphasis that has been placed on the avoidance of too great pressure in the Prone Pressure method. Men are cautioned not to drop on the victim with any violence, and not to return to the "rest" position by a sudden thrust against the victim. Here again, training is of the very essence of the whole matter and the experience among linemen who regularly practice the Pole Top method has shown nothing that would constitute an argument against its use. It is my understanding that this point of view is consistent with the results of Dr. Kouwenhoven's recent investigation and in the report on which there is no mention of this at all, in spite of his having worked with a number of subjects of varying physical characteristics.

(3) Case Review Procedure—EEI Resuscitation Review Board

It will be remembered that at the October 19 meeting of this section, Dr. Drinker suggested in the closing remarks of his discussion that it would be very helpful if the Edison Electric Institute would undertake to receive reports on cases of electric shock, in order that the information that would thus accumulate over a period of time could be analyzed and conclusions reached that would be helpful to all concerned. The EEI Accident Prevention Committee had taken action to bring this about at its meeting in New York during the previous week, and Dr. Drinker's suggestion and proposal of form were welcomed.

I made a preliminary report to your Executive Committee at its meeting in Roanoke last spring and am now pleased to report to you the appointment of a Resuscitation Review Board of the Accident Prevention Committee EEI, which will receive and review all reports on important electric shock cases which come to its attention as the result of procedure already set up and now beginning to function.

The personnel of this board is one of which we can all feel justly proud and I am glad of this opportunity to express our appreciation to each and every one of these men from the fields of medicine, physiology, and our own industrial ranks who have offered their services to the Board and to the furtherance of its purposes.

The fullest cooperation on the part of all concerned is solicited and the forms

(*Continued on page* 524)

Reconstruction of Single Pole 66-Kv Transmission Line for 110-Kv Operation

By J. F. Pennington
Georgia Power Company

Presented at a Meeting of Transmission and Distribution Committee, EEI, Atlanta, Ga., Oct. 14-15-16

THIS line which we will attempt to describe extends from Gordon Substation of the Georgia Power Company to Dublin, a distance of 34.88 miles, and is an extension of a 19-mile line between Macon and Gordon. It was constructed in 1927 and is the principal source of supply to an area of 8800 square miles in 20 Georgia counties with a total population of over 293,000. (Fig. 1.) At the time this line was constructed the peak load in this area was about 3000 kw. This load has grown continuously since service was established by the company, showing increases even during the depth of the last depression, and today the peak is over 14,000 kw, providing an annual gross revenue in the neighborhood of a million dollars.

This load growth, of course, necessitated many changes to keep pace with it, and as most of them had to be made during rather lean years, the cost had to be kept to a minimum. While all of these changes do not necessarily have anything to do with a description of the line conversions, some of them which lead up to the conversion of the line are of interest.

The line was constructed with no particular provision in design or construction for operation at any voltage higher than 66,000. At the same time a 66/44-kv substation was built at Dublin with 4500 kva of transformer capacity to handle the entire output of the line. (Fig. 2.) In the four-year period to 1931 the load had increased to the point where it exceeded the 4500-kva capacity and voltage conditions were unsatisfactory, particularly during the peak load season in September and October. To take care of this situation we installed at Dublin a 12,000-kva, 3-phase, 44-kv voltage regulating transformer, and at the same time installed cooling fans on the 4500-kva transformer bank, increasing its capacity to approximately 5625 kva. By 1936 the load had exceeded this capacity, and voltage conditions were again becoming unsatisfactory.

The next step in keeping pace with the load, still with an eye on costs, was to convert the 19-mile section of line between Macon and Gordon from 66 kv to 110 kv and install a 110/66-kv autotransformer bank at Gordon to supply Dublin. This scheme was selected largely because we had available an old bank of transformers for which we had no other immediate use, and which we found could be reconnected in our own shop for 110/66-kv operation for a small cash outlay. Also, that another 4500-kva bank which had outlived its usefulness at another location was available for additional 66/44 kv capacity at Dublin. (Fig. 3.) These changes enabled us to satisfactorily handle the load until 1938, in which year the Gordon-Dublin line was changed to 110 kv and a 20,000-kva, 110/44-kv tap changing under-load transformer bank installed at Dublin. (Fig. 4.)

The necessity for these further changes

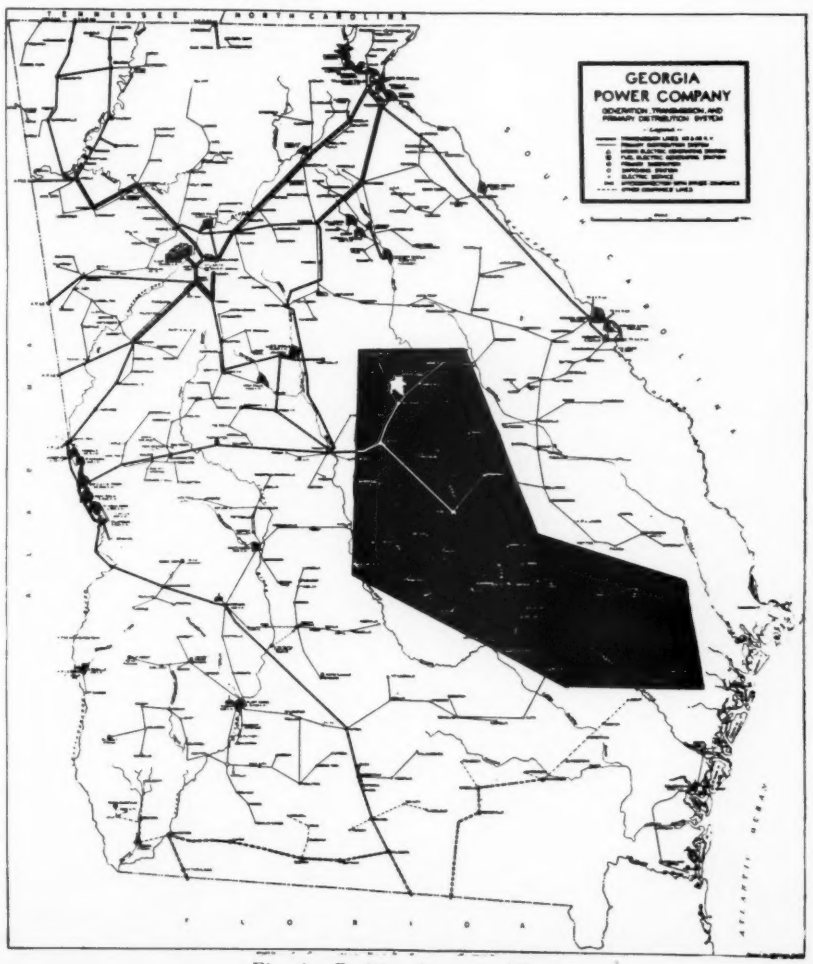


Fig. 1—Dublin Area—in Black

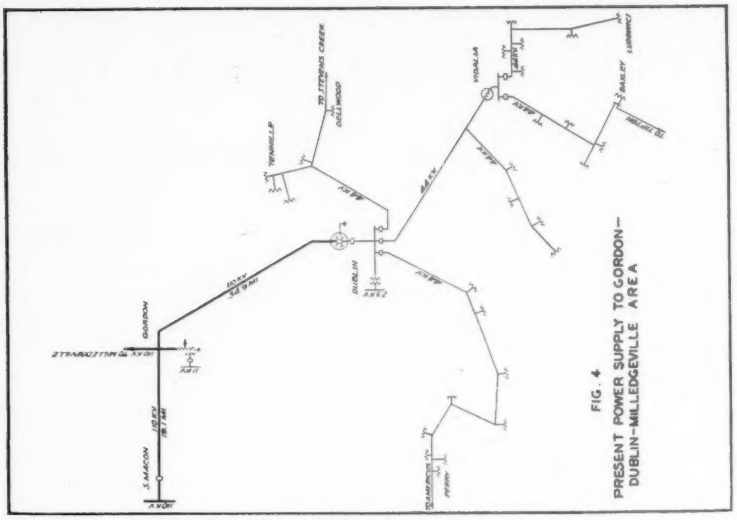


Fig. 4

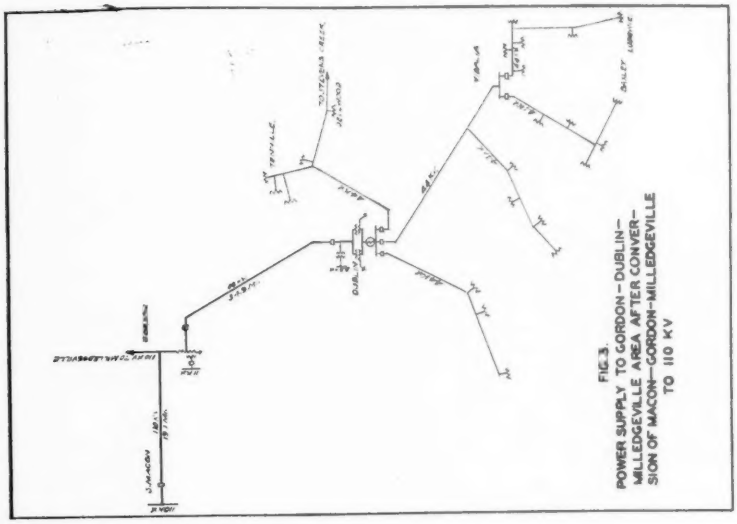


Fig. 3

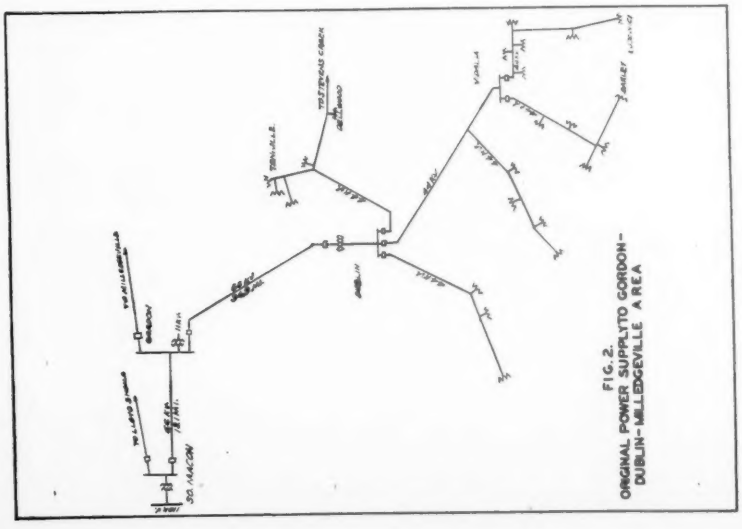


Fig. 2

and improvements was indicated in 1937 and studies made by the Engineering and Operating departments showed that both additional substation and line capacity was necessary, and that such capacity should be provided at 110 kv. The other sources of supply to this area, which at that time consisted of two 44-kv tie lines to Stevens Creek and Americus, were no longer adequate during normal load periods, and any changes had to be such that they could be made without interfering with the operation of the existing line and equipment during such periods. The possible schemes for doing this seemed to be:

(a) Constructing a complete new 110-kv line adjacent to and without interfering with operation of the existing 66-kv line. This was estimated to cost $134,500.

(b) Reconstructing the existing single-pole 66-kv line, converting it to H-frame type of construction, estimated to cost $60,373.

(c) Converting the existing 66-kv line to 110-kv operation, continuing the single-pole type of construction, estimated to cost $42,444, which figure included approximately $6,000 for maintenance items not properly chargeable as a part of the cost of converting to 110-kv, such as replacement of defective cross arms, poles, etc.

In view of the low first cost of the last scheme, further and more detailed studies were made, from which it was concluded that it was thoroughly practicable to do this work with safety to workmen and without interfering with service. We were further influenced by the fact that the operating record of this line at 66 kv was exceptionally good, as it traversed territory which is not subject to severe ice storms, and which seemed to be unusually free from lightning storm disturbances. In the 11 years it had been in service there had never been a permanent fault, and momentary outages due to temporary line faults averaged only .5 per hundred miles of line per year, which was better than any of our 110-kv lines.

Originally there were 485 structures in this line, averaging 50 ft. in height, with a pole ground on each structure but no overhead ground wires: two 5 in. x 7 in. x 10 ft. cross arms spaced 6 ft. apart with conventional steel bow braces; two conductors carried in suspension on the top arm and one on the bottom arm. The conductors were, and are 1/0 copper. The insulation consisted of five 10-in. disks with 5-in. spacing in suspension and seven in strain. A two-conductor telephone circuit was attached to the structure 12 ft. below the bottom power conductor arm. (See Fig. 5.)

The changes to adapt the line for 110-kv operation were fairly simple, and gave a well-balanced structure from a stand-

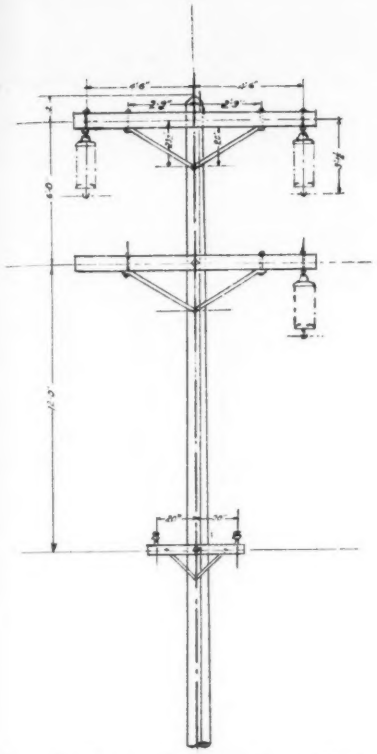


Fig. 5—Gordon-Dublin Line. Typical Tangent Structure Original 66-kv Construction.

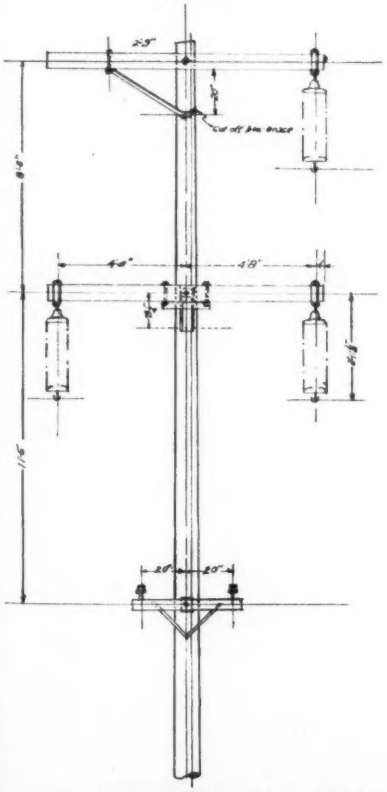


Fig. 6—Gordon-Dublin Line. Typical Tangent Structure After Changes for 110-kv Operation.

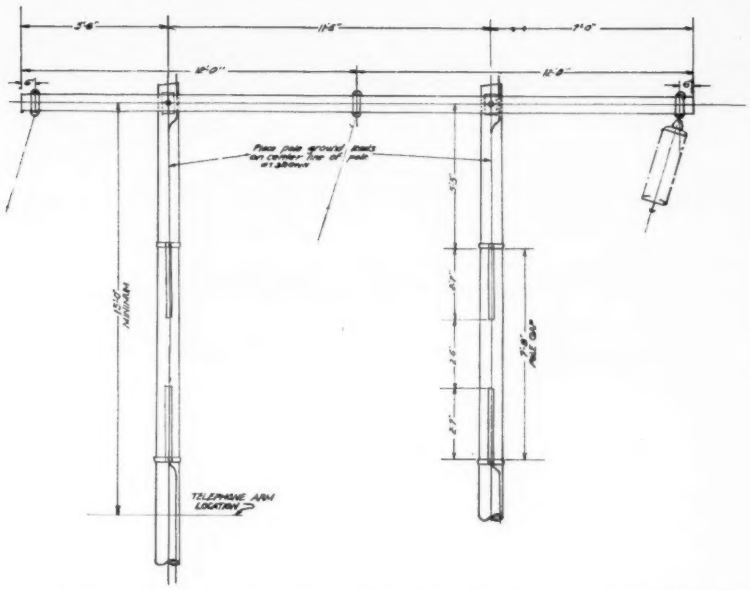


Fig. 7—Gordon-Dublin Line; Offset Arm H-frame Structure for Small Angles.

point of insulation and clearances. (Figs. 5 and 6.) The changes consisted mainly of: 1) lowering the bottom power conductor arms 2½ ft. to a point 8 ft. 6 in. below the top arms, eliminating the conventional steel bow braces on these arms, replacing them with brace gains, and cutting off one-half of the steel bow braces on the top arms; 2) lowering the telephone circuit to a point 11 ft. 6 in. below the new position of the bottom power conductor arms; 3) reversing the arrangement of the power conductors, installing two on the bottom cross arms and one on the top arms; 4) replacing the single-pole structures with new two-pole, H-frame structures for small angles (Fig. 7), and the two-pole structures with three-pole structures for medium and large angles (Fig. 8)—(there were only 23 such structures on the entire line); 5) installing air gaps in the pole grounds on some of the special structures and cutting off the arcing horns on all suspension clamps; and 6) increasing the insulation to 7 units per string in suspension and 9 in strain.

Reversing the arrangement of the conductors was not essential, but it was felt that there would be some advantage in getting the conductors closer to the ground and in slightly reducing the loading on the poles.

The pole ground gaps were used on several of the special structures where the complete original structure was reused in the line. Due to the pole spacing, length of cross arm, etc., it was not possible to obtain satisfactory clearance with a solid ground on the pole. The

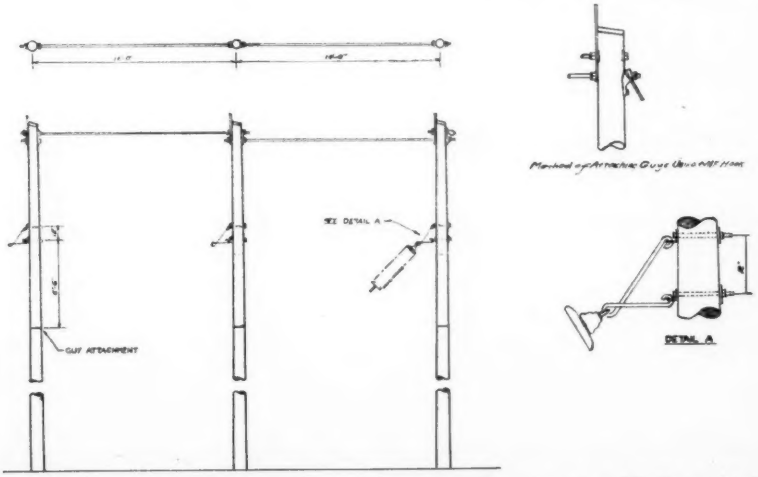


Fig. 8—Gordon-Dublin 110-kv Line; Three-Pole Structure for Medium Angles.

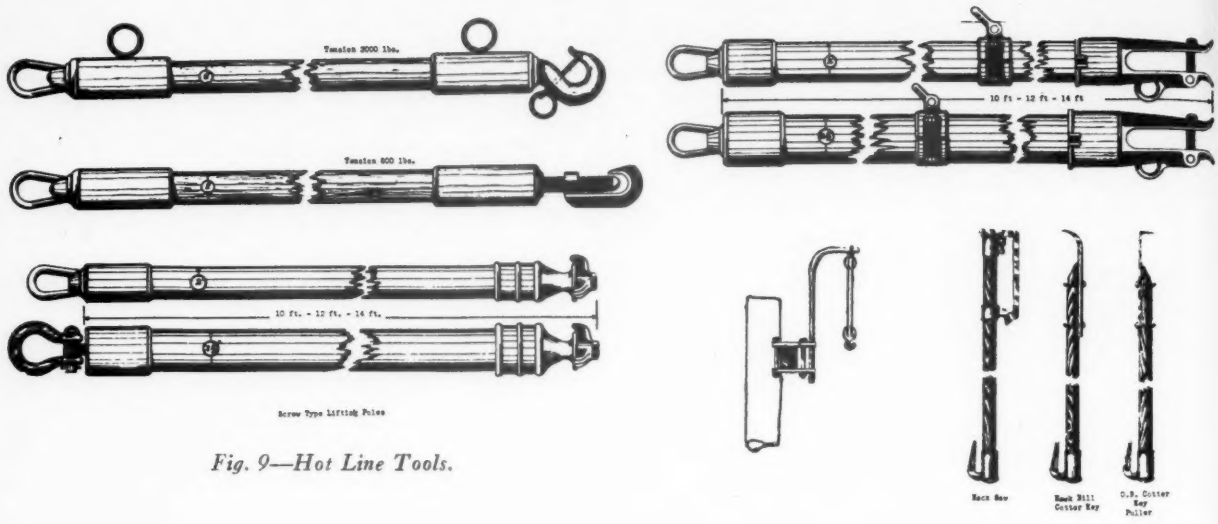

Tension 2000 lbs.
Tension 600 lbs.
10 ft. - 12 ft. - 14 ft.
Screw Type Lifting Poles
10 ft - 12 ft - 14 ft
Hack Saw
Hook Hill Cotter Key
O.B. Cotter Key Puller

Fig. 9—Hot Line Tools.

use of the brace gains in place of the conventional bow braces aided in getting the maximum benefit from the insulation value of the wood. Incidentally, this brace gain (Fig. 6) was developed largely through the efforts of Lee Ragsdale, who for some 25 years, until his death, was in charge of our transmission lines. We have used this gain quite extensively and with good results.

In laying out this work it was found possible to eliminate two complete structures in the line, thereby reducing the total number to 483, 460 of which were tangent structures and 23 special dead-end or angle structures.

Sunday being about the only day of the week during which the load was light enough to be handled by the two 44-kv tie lines, it was obvious that a substantial majority of the work would have to be handled with the line "hot." One of the major problems in handling the actual construction, therefore, was keeping the line in operation and properly safeguarding the workmen against injury.

Another problem, of course, was weather conditions, as hot-line work could not be done safely in damp weather, and about 20 days' time was lost from this cause.

Fortunately, we had two thoroughly capable line crews, specially trained in hot-line work. These crews were equipped with complete sets of hot-line tools, including some specially developed for this particular job (see Fig. 9). Placed in charge of a thoroughly experienced general foreman, they handled all of the hot-line work with occasional assistance from some of the regular maintenance crews on such work as was done on Sundays when the line was out of service. Actually, the entire 460 tangent structures were reworked with the line in operation with no interference whatever to customers' service.

The actual hot-line work was comparatively simple. A derrick was installed on the cross arms, and by means of Fuzz sticks, tackle blocks, guide lines, etc., the conductor was transferred from the insulator strings to the derrick. (Fig. 10.) In cases where the cross arm had to be replaced or relocated it was necessary to install a so-called "false arm" for the derrick. The usual hot line wrenches, hack saws, and cotter pin pullers were used to remove insulator clamps, saw off arcing horns, remove insulator strings, etc.

Construction was started May 3 and completed and the line changed over to 110 kv July 24, all actual work on the

(*Continued on page* 518)

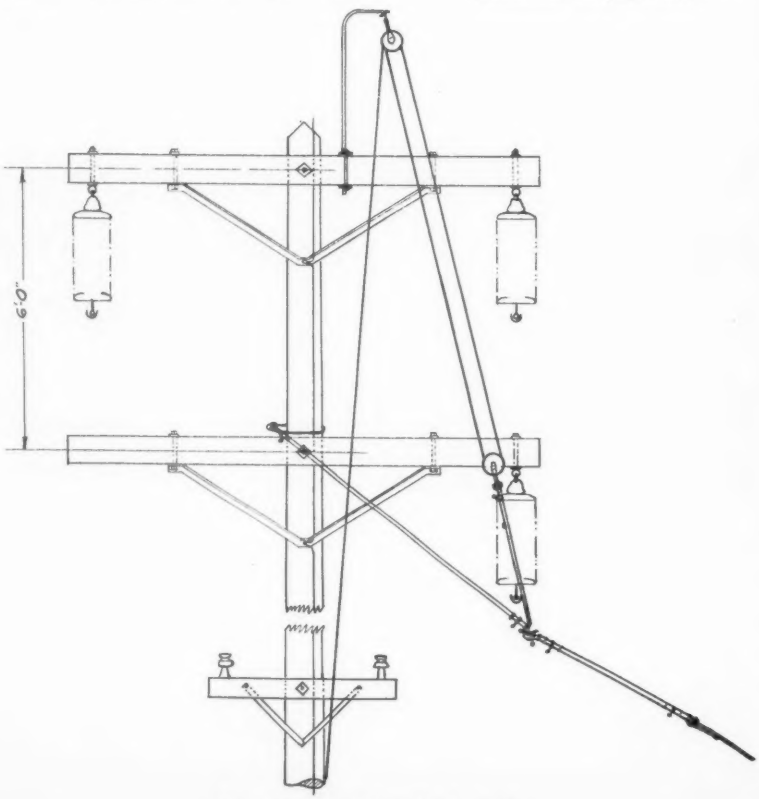


Fig. 10—Hot Line Tools in Use.

Creosote Treatment of Douglas Fir Crossarms

By L. G. Smith

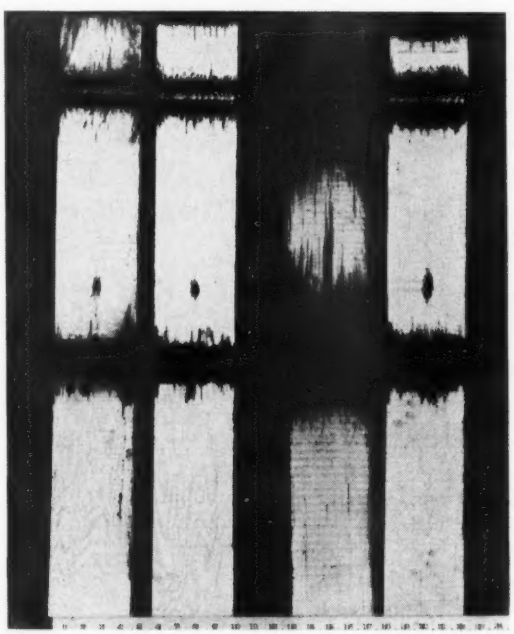
Chairman, Timber Products Subcommittee, Transmission and Distribution Committee, EEI

IN recent years, dissatisfaction has been expressed with the life being obtained from untreated Douglas fir crossarms. Since the rate of decay is influenced by local weather conditions, complaints have not been received from all parts of the country. There are definite limits as to the increased life that can be obtained by more restrictive specifications for untreated arms. More restrictive specifications will result in price increases not commensurate with the increase in life. In spite of rigid specifications, the life of untreated crossarms will be limited by the characteristics of the untreated wood. Therefore, the solution is to purchase crossarms under specifications that will result in crossarms having the desired strength and containing no decayed wood and require that they be adequately treated with a preservative.

This report reviews tests made by the Consolidated Gas, Electric Light and Power Company to determine the proper type of creosote preservative treatment by an open tank process. Many of the manufacturers use a short dip creosote treatment of from 5 to 15 minutes. The efficiency of this type of treatment is questionable. Another consideration is a treatment that will give adequate penetration of creosote and in addition sterilize the entire arm.

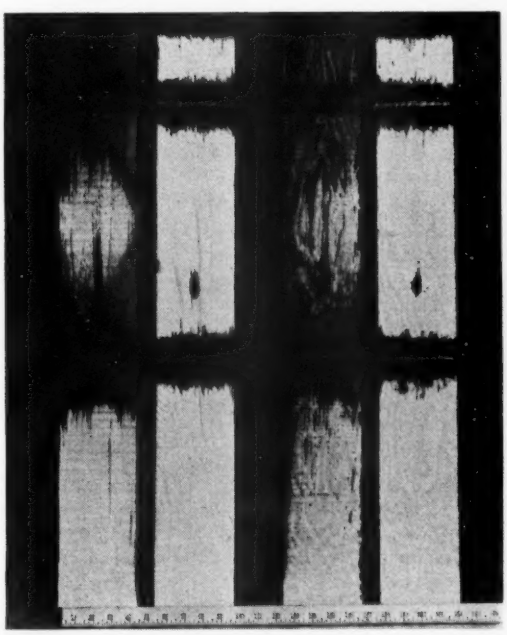
Tests indicate that when crossarms are immersed in creosote at 215 F, five to six hours are required for the inner part of a cross arm to attain a temperature from 203 to 212 F, i. e., to sterilize the arm completely. To determine the efficiency of the 5 to 15 minute dip treatment, a series of test crossarms were cut in half. Samples of one set of half arms were given 5, 10 and 15 minute dip treatments in creosote at 215 F. All of the samples in the other set of half arms were given a non-pressure treatment consisting of one hour in creosote at 100 to 215 F, three hours at 215 F and four hours at 215 to 175 F. This made it possible to compare the results obtained from a short time dip treatment on one half arm with a long time hot and cold treating cycle treatment on the other half of the same arm.

In Figure 1, sample 1 has been sawn lengthwise after receiving the hot and cool treating cycle. Sample 1-5 is the other half of the same arm after a 5 minute hot dip treatment. Sample arm No. 1 was a wood relatively hard to treat. However, the complete treating cycle resulted in more complete and grain penetration than the 5 minute dip. Sample No. 2 in Figure 1 shows one half of another arm after the hot and cool treating cycle. Sample No. 2-5 is the other half of the arm after a 5 minute hot dip treatment. In this arm, a much better end grain penetration is obtained by the longer treatment. In Figure 2, similar comparisons are made except the hot dip treatment was increased to 10 minutes. Sample No. 3 and 3-10 are two halves of the same arm, the former having the hot and cool treatment and the latter the 10 minute hot dip. The same applies to Samples No. 4 and 4-10. In Figure 3, similar comparisons are shown for a 15 minute hot dip treatment. It should be noted that increasing the length of time of the hot



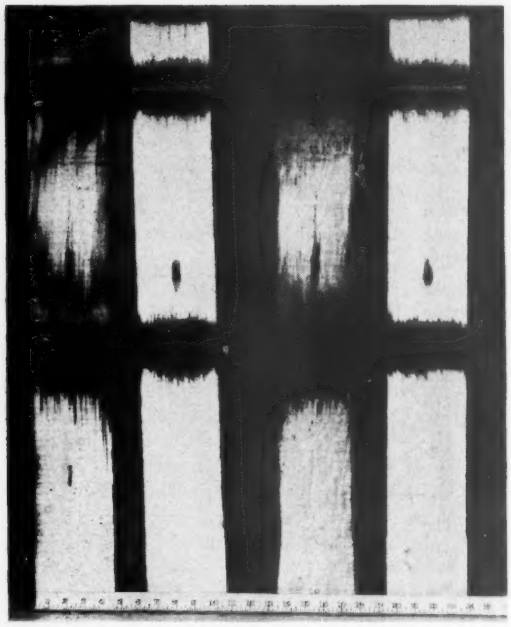
1 1-5 2 2-5

Fig. 1—Nos. 1 & 2: Creosote 1 hr. 100-215 F. Nos. 1-5 & 2-5: Creosote 5 min. 215 F



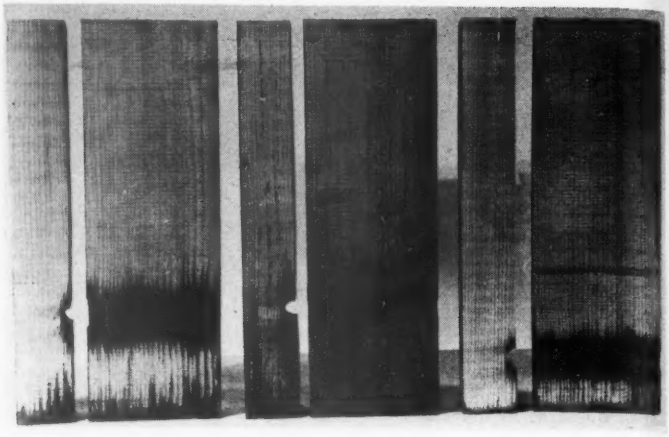
3 3-10 4 4-10

Fig. 2—Nos. 3 & 4: Creosote 1 hr. 100-215 F; 3 hrs. 215 F; 4 hrs. 215-175 F. Nos. 3-10 & 4-10; Creosote 10 min. 215 F



6 6-15 7 7-15

Fig. 3—Nos. 6 & 7: Creosote 1 hr. 100-215 F. Nos. 6-15 & 7-15: Creosote 15 min. 215 F



41 42 43

Fig. 4—No. 41: No Hot Treatment; 3 hr. Cold Treatment. No. 42: 5 hr. Hot; 3 hr. Cold. No. 43: 5 hr. Hot; No Cold

dip has practically no effect upon the end grain penetration. In all cases a complete hot and cool treating cycle results in materially better penetration.

Figure 4 shows tests made which indicate that if the hot treatment is extended to as long as five hours, very little increase in end grain penetration is obtained. Likewise, a prolonged cold treatment, not preceded by a hot treatment, shows no improvement. This is obvious when samples No. 41 and 43 in Figure 4 are compared with samples No. 1-5, 2-5, 3-10, 4-10, 6-15 and 7-15 in Figures 1, 2 and 3. As noted in sample 42 in Figure 4, neither a five hour hot nor a three hour cold treatment results in desirable end grain penetration but a combination of the two (hot followed by cold) results in much improved penetration.

These data indicate the limited penetration obtained by any short-time hot dip creosote treatment of Douglas fir crossarms. However, the object of this report is not to present a case for the open tank treating cycle but to demonstrate the inadequacy of the hot dip process. Data from other companies indicate that a pressure treating cycle (consisting of initial air, creosote under pressure, vacuum, steam and vacuum resulting in retentions of 4 to 6 pounds per cubic foot) will result in penetrations as good if not better than with the open tank treatment. If treatment of fir arms is desirable, since the cost is slight, an effective treating cycle rather than a short time hot dip process should be used. The purchasers of crossarms should unite in adopting adequate treating specifications for Douglas fir crossarms including both pressure-vacuum and open tank methods for arms used in localities favorable to decay.

General Keller Ordered to Active Duty by War Department

BRIGADIER GENERAL CHARLES KELLER has been ordered by the War Department to return to active duty as District Engineer of the Chicago District. Since 1923 General Keller has been associated with the Standard Gas and Electric Company System in various engineering and executive capacities. He has served as a member of the engineering and administrative staffs of Public Utility Engineering and Service Corporation and as president of Empresa de Servicios Publicos de los Estados Mexicanos; also as consultant on hydroelectric projects. During the World War General Keller performed important War Department assignments in this country and in France, where he was Deputy Chief Engineer of the AEF. Returning to the United States in June, 1919, he held the post of resident engineer of the board of engineers for rivers and harbors until October, 1921, when he became engineer commissioner of the District of Columbia. He resigned to join the Standard Gas and Electric system in 1923.

Reconstruction of Line

(*Continued from page* 516)

line being handled to completion with only one minor personal injury accident, which was caused by a small piece of material dropping from a pole and striking one of the workmen. Unfortunately, however, while the crews were being moved away from the job, one of the trucks carrying several of the men turned over, causing serious injury to two men and minor injuries to two others.

At this date the line has been in operation at 110 kv over 24 months with no permanent faults and only four momentary trip-outs (breaker is instantaneous reclosing) due to temporary faults on this line. This is at the rate of less than 5.7 trip-outs per hundred miles of line per year, and compares favorably with the performance of the best shielded line on our system, which is averaging around four trips-outs per hundred miles per year.

We are well pleased with the performance of this line, and would undoubtedly do the same sort of job in converting any other line of similar construction; however, for a complete new line, it may be found just as economical to use the conventional H-frame construction, particularly where it is possible to use very long spans, which would not be practical with single poles.

Method of Cable Identification and Determination of the Identity of Phase Conductors

By F. B. Kargle

Consolidated Edison Company of New York

Paper presented before the Transmission and Distribution Committee, E.E.I., Atlanta, Ga., Oct. 14, 1940

IT IS the purpose of this report to describe the various methods that have been used in the identification of cables and the individual phase conductors of circuits and feeders on the electric system of the Consolidated Edison Company of New York, Inc.

With the development of the underground system, the transmission and distribution system has become larger and more complicated. In order to provide electric service of the highest quality, it is desirable to reduce to a minimum the outage of primary feeders which have been removed from service in order to make repairs or alterations.

These factors have also increased the importance of safety in connection with the operation and maintenance of high voltage cables.

In recognition of the foregoing requirements, changes have been made at various times in the methods of identifying cables and the phase conductors of primary feeders.

All the methods which are considered here are concerned only with cables which are to be worked upon while they are de-energized or dead. It is an essential prerequisite of each method that the cable which is to be worked upon, be removed from service and disconnected from all possible sources of energy by opening all manually or automatically operated disconnecting devices associated with the feeder cable.

When the system was small and less complicated, the cable to be worked upon was removed from service and grounded at its terminal points. The accepted practice consisted of selecting the cable at the location of work by its cable tag and duct record. A cable pike or spear was driven into the cable, grounding the conductors. The cable was then cut and the conductors cleared for "sending the phases" from the station to the location where the cable was cut.

One of the earliest methods of identifying the phase conductors was by "flashing with lamps" (Fig. 1). At the station "A" phase was made alive through a lamp. Then at the working point a test was made between each conductor and ground with another lamp. The lamp would light when it was connected between "A" phase conductor and ground; at the same time the lamp in the station would also light.

The splicer in the field would leave his lamp connected, allowing both lamps to burn steadily. The station operator would then open and close the lamp circuit several times, causing both lamps to flash, and finally leave the lamp circuit closed. This initial flashing was the station operator's signal to the splicer that he was ready to disconnect the lamp from "A" phase and connect same to "B" phase.

The splicer in the field, after he had marked "A" phase conductor, acknowledged the signal by "flashing" in return. "B" phase and "C" phase conductors were identified and marked in this sequence in the same manner. For a check, the splicer grounded one phase at a time through a lamp in the A-B-C sequence, and the station operator checked the phase by making the conductor alive through a lamp. The operator "flashed" to the splicer and the splicer flashed in return before proceeding to check the next phase.

Another method of identifying the phase conductors by means of lamps was known as "A" alive, "B" grounded and "C" clear. At the station "A" phase conductor was made alive through a lamp, "B" phase conductor was grounded, and "C" phase conductor was left clear (Fig. 2). In the field "A" phase conductor was first determined by testing from each conductor to ground with a lamp. The lamp would light when it was connected between "A" phase and ground. "B" phase conductor was next determined by testing from "A" phase conductor to each of the other conductors. The lamp would light when it was connected between "A" and "B" phase conductors (Fig. 3). The remaining phase was "C." However, a lamp check was made between the "C" phase conductor and ground; also between "C" phase and each of the other two phases. The conductors were marked to identify the phases.

Various other practices of identifying the phase conductors were in effect from time to time, such as telephone communications on individual conductors; applications of various low voltage potentials which were observed in the field by use of a low reading voltmeter; these with several other methods became obsolete with the introduction of the alternating current network system of distribution.

With the development and expansion

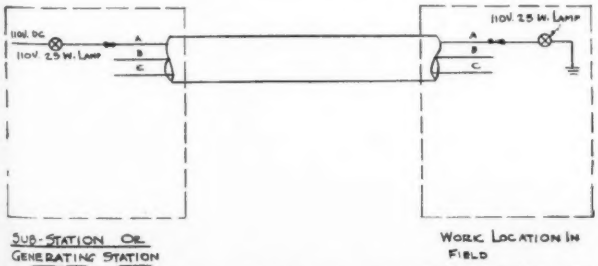


Fig. 1—Phase Selection by Means of the "Flash Method."

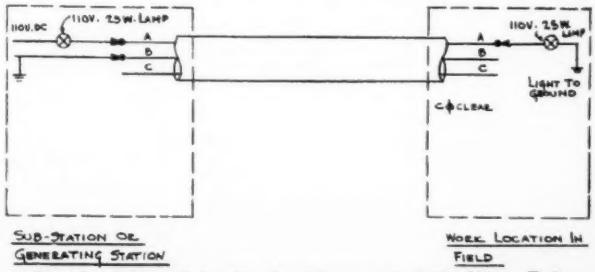


Fig. 2—Phase Selection by Means of A Φ Alive, B Φ Grounded, C Φ Clear.

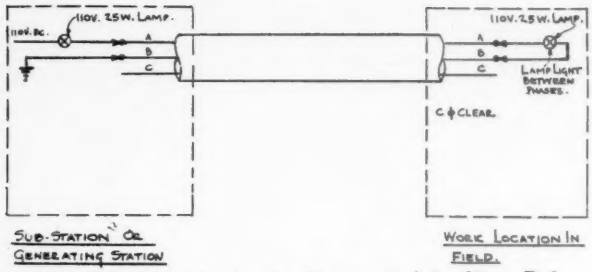


Fig. 3—Phase Selection by Means of A Φ Alive, B Φ Grounded, C Φ Clear.

of the system, cable identification requirements became more rigid. As a result, when a cable was removed from service an initial short-circuit was applied at a terminal point beyond the location of work. A "woodpecker" or a "Lundin" set was connected to the conductors at the station, sending out a characteristic signal which was detected on the cable at the working point by means of a telephone receiver connected to an exploring coil. After the cable was identified it was grounded at its terminal points, speared, cut, and the identity of the phase conductors determined by one of the methods previously described.

In 1923 the directional-impulse tracing-current method was developed for fault locating[1] and shortly thereafter utilized for the identification of cables and their phase conductors. This method provided for the first time an identification which not only was positive and visual, but also permitted designing a distribution system whereby the high tension cables could be directly connected to the transformers without providing means for disconnecting the cable. It is necessary, however, that the transformers be equipped with a means for grounding the cables in order to make use of the tracing current method of identification.

In the application of this method of identification and phase selection of cable, the feeder is removed from service and de-energized, after which initial short circuits and grounds are applied at a terminal point beyond the location of work. A tracing current transmitter (Figs. 4 and 4-A), requiring a 120-volt ungrounded direct current supply, was connected to "A" and "B" phase conductors at the station (Fig. 5). "C" phase conductor was left clear. A continuous series of periodic tracing current impulses at a frequency of 30 impulses per minute was sent out over "A" and "B" phase conductors; positive periodic impulses on "A" phase; negative periodic impulses on "B" phase (Fig. 6).

[1] "Locating Underground Cable Faults," *Electrical World*, December 26, 1925. Vol. 86, page 1297.

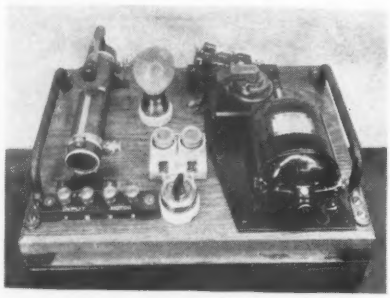


Fig. 4.

A polarized arc-shaped exploring coil connected to a zero-centered galvanometer (Fig. 7) was used in the field for the performance of the cable identification and phase selection tests. For the identification of the phase conductors by this method, it was essential to know the electrical direction of the tracing current source with respect to the location of work.

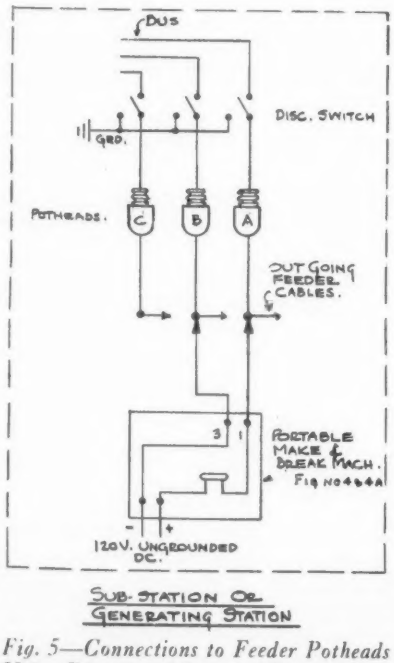


Fig. 5—Connections to Feeder Potheads Using Directional Impulse Tracing Current.

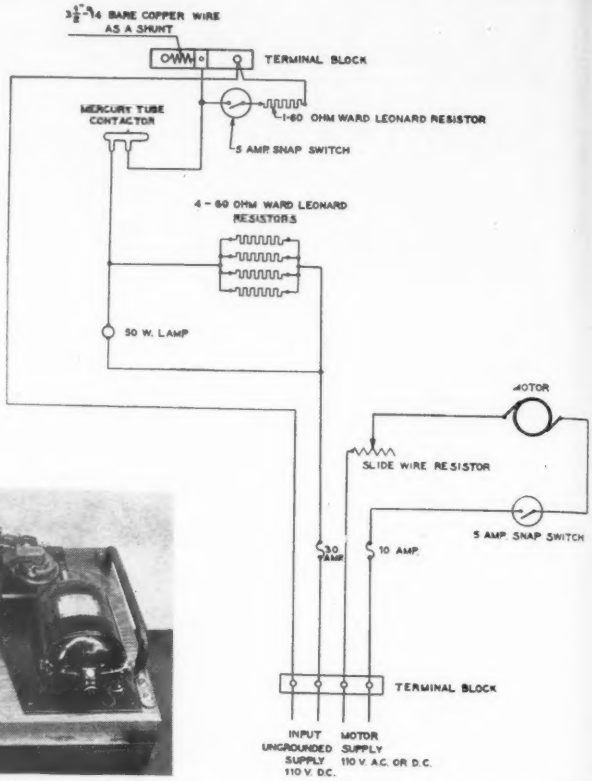


Fig. 4A—Make and Break Machine for Tracing Current. Wiring Diagram for Single Phase Machine.

In the case of a three-conductor cable, the cable was first identified. This was accomplished by placing the coil on the cable and moving it around the circumference of the cable by small steps until the cable had been completely encircled. As the coil was moved around the cable the galvanometer deflections were observed. A satisfactory identification was obtained when positive deflections were observed around one-half of the cable, the deflections gradually increasing from a zero value to a maximum, then gradually decreasing to a zero value; negative

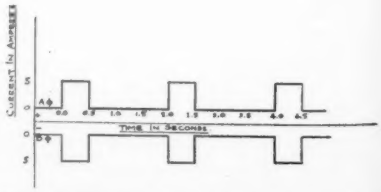


Fig. 6—Wave Form for Directional Impulse Tracing Current.

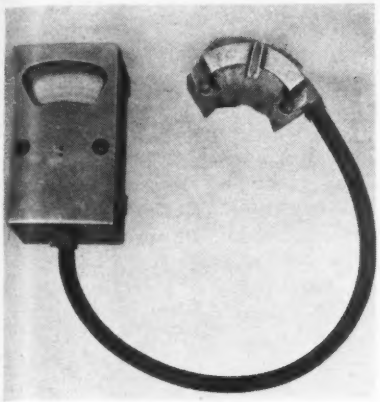


Fig. 7.

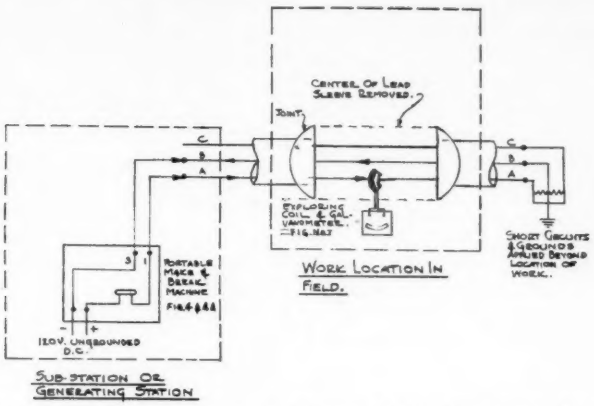

CENTER OF LEAD SLEEVE REMOVED.
JOINT
C
B
A
EXPLORING COIL & GAL. VANOMETER. FIG. 16A-3
PORTABLE MAKE & BREAK MACHINE FIG. 6 & 6A
120 V. UNGROUNDED D.C.
SUB-STATION OR GENERATING STATION
WORK LOCATION IN FIELD.
SHORT CIRCUITS & GROUNDS APPLIED BEYOND LOCATION OF WORK.

Fig. 8—Phase Selection by Means of the Directional Impulse Tracing Current Method.

deflections were observed around the other half of the cable, increasing from zero value to a maximum, then decreasing to a zero value.

After the identification test was completed, a cable certification tag (Fig. 14-A) was fastened to the cable. The cable was then grounded at the station and the tracing current transmitter removed. An additional safety precaution was provided by grounding the cable by means of a remote controlled grounding spear, which was clamped to the cable at the working point. The joint filling compound was then removed to allow the insulated conductors to be spread apart if necessary.

Tracing current was re-applied at the station and the station grounds removed.

The identification of the phase conductors was made by placing the exploring coil on each conductor in turn, with the polarity mark of the coil facing toward the source of the tracing current (Fig. 8). When the coil was placed on "A" phase conductor, a continuous series of positive periodic deflections were observed on the galvanometer; with the coil on "B" phase conductor, a continuous series of negative periodic deflections were observed; while when the coil was placed on "C" phase conductor no deflections were observed. The conductors were then identified and marked to des-

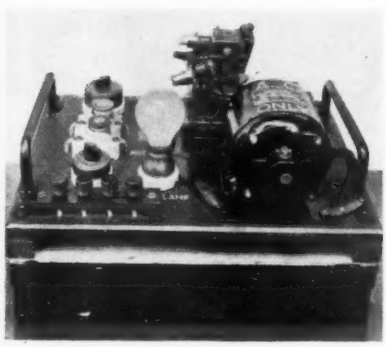


Fig. 9.

Fig. 9A.

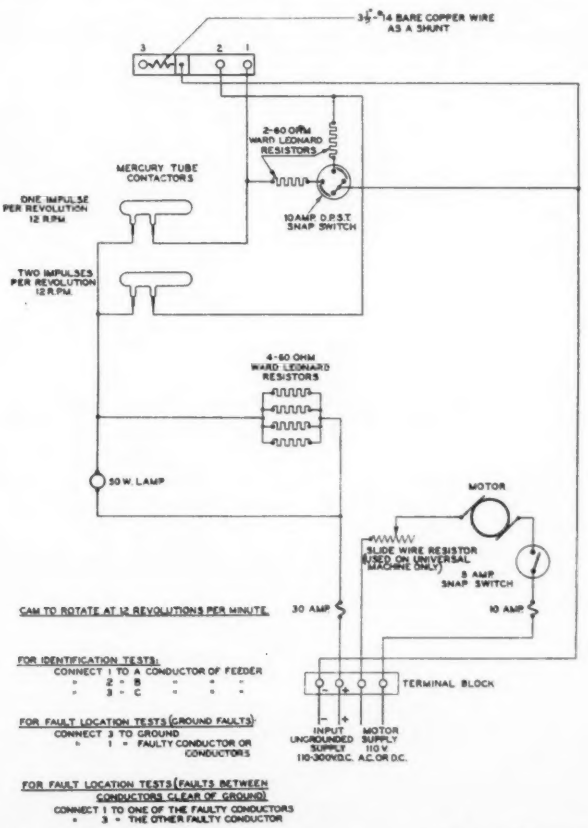

3½"-#4 BARE COPPER WIRE AS A SHUNT
3 2 1
2-60 OHM WARD LEONARD RESISTORS
MERCURY TUBE CONTACTORS
ONE IMPULSE PER REVOLUTION 12 R.P.M.
10 AMP D.P.S.T. SNAP SWITCH
TWO IMPULSES PER REVOLUTION 12 R.P.M.
4-60 OHM WARD LEONARD RESISTORS
50 W. LAMP
MOTOR
SLIDE WIRE RESISTOR (USED ON UNIVERSAL MACHINE ONLY)
5 AMP SNAP SWITCH
10 AMP
CAM TO ROTATE AT 12 REVOLUTIONS PER MINUTE.
30 AMP
FOR IDENTIFICATION TESTS:
CONNECT 1 TO A CONDUCTOR OF FEEDER
" 2 - B " " "
" 3 - C " " "
TERMINAL BLOCK
FOR FAULT LOCATION TESTS (GROUND FAULTS):
CONNECT 3 TO GROUND
" 1 = FAULTY CONDUCTOR OR CONDUCTORS
INPUT UNGROUNDED SUPPLY 110-300 V.D.C.
MOTOR SUPPLY 110 V. A.C. OR D.C.
FOR FAULT LOCATION TESTS (FAULTS BETWEEN CONDUCTORS CLEAR OF GROUND)
CONNECT 1 TO ONE OF THE FAULTY CONDUCTORS
" 3 = THE OTHER FAULTY CONDUCTOR

Fig. 9B—Tracing Current Transmitter. Wiring Diagram.

ignate the respective phases. The station grounds were re-applied and the tracing current transmitter removed. Additional field grounds were also applied for the protection of the splicer in the event of an accidental closure of a network protector switch. The cable conductors were then cut.

In the case of a feeder consisting of three single conductor cables, the phase identification was combined with the cable identification. The phases were identified exactly as when the conductors were exposed within a three conductor joint.

It was occasionally necessary to identify the phase conductors of a feeder cable at locations where the direction of the tracing current source was doubtful, particularly at locations where the cables entered and left through the same wall of a manhole. This led to the development of the continual action tracing current method. After the cable was removed from service and the initial ground applied, a tracing current transmitter employing two mercury contactors (Figs. 9, 9-A, 9-B) was connected to the three conductors at the station (Fig. 10). A continuous series of periodic tracing current impulses were sent over each conductor: 12 single positive periodic impulses per minute on "A" phase conductor, 12 double positive periodic impulses per minute on "B" conductor, and 36 negative periodic impulses per minute on "C" phase conductor (Fig. 11).

In the case of a feeder comprised of single conductor cables, the cable identification and the phase identification tests were made at the same time. For the phase identification test it was not necessary to consider the direction of the tracing current source. When the exploring coil was placed on "A" phase conductor, a continuous series of *single* periodic deflections were observed on the galvanometer; with the coil on "B" phase conductor, a continuous series of *double* periodic deflections were observed; while when the coil was placed on "C" phase conductor a continuous series of periodic deflections were observed. The deflections on "C" phase conductor were characteristically different from the single and double deflections observed on "A" and "B" phases, and were the resultant of the combined current impulses of "A" and "B" phase conductors.

In the case of a three-conductor cable, the cable was first identified. The coil was placed on the cable and moved around the cable circumference by small steps until the cable had been completely

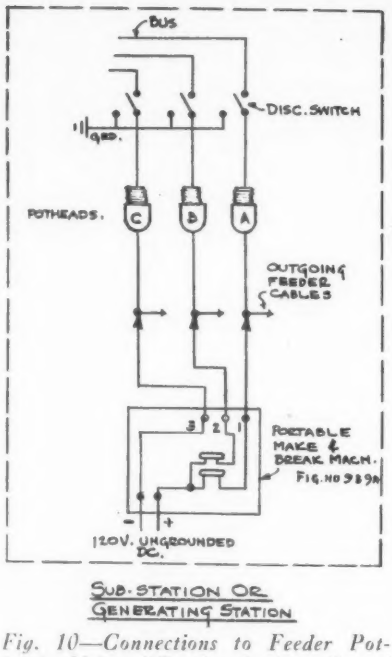


Fig. 10—Connections to Feeder Potheads Using "Continual Action" and "Individual Action" Tracing Current.

encircled. As the coil was moved around the cable, the galvanometer deflections were observed at each point. *Single* periodic deflections were observed at two points on the cable; one point was when the center of the exploring coil was over "A" phase conductor (Fig. 12, Pos. 1); the other point was when the center of the coil was diametrically opposite "A" phase, or 180 degrees around the cable (Pos. 2). *Double* periodic deflections were observed at two points on the cable, one over the "B" phase conductor (Pos. 3), the other opposite "B" phase (Pos. 4). Likewise, continuous periodic deflections were observed at two points, one over the "C" phase conductor (Pos. 5), the other opposite "C" phase (Pos. 6).

This method would permit the determination of the position of the phase conductors, on the cable sheath or joint sleeve of a three-conductor cable, provided the direction of the tracing current supply was known.

This method, like the single-tube method, was also unsatisfactory at certain locations where the cable arrangements in a manhole were such that the

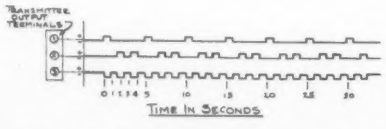


Fig. 11—Wave Form for Continual Action Tracing Current Using Two Tubes.

direction of the tracing current source could not be accurately determined.

As a result a method in which the direction of the tracing current source is not essential was devised, and this is known as the "Individual Action" tracing current. This method is now used for all tests which require either cable identification or phase identification on single conductor or three conductor cables.

As with the other tracing-current methods, the cable is removed from service, an initial ground is applied and a tracing current transmitter, using two mercury contactors, is connected to the three conductors at the station (Fig. 10). A series of 12 single periodic positive impulses are sent out on "A" phase conductor for each alternate one-minute interval, while no current impulses are sent out during the intermediate one-minute intervals; 12 double positive periodic impulses are sent out on "B" phase conductor during the intermediate minute intervals, while no current impulses are sent out during the alternate minute intervals; 12 single periodic negative impulses are sent out on "C" phase conductor during the alternate minute intervals while 12 double periodic negative impulses are sent out during the intermediate minute intervals (Fig. 13).

To determine and mark the position of the phase conductors on the lead armor of a three-conductor cable, the exploring coil is placed on the cable and the galvanometer deflections are observed. Assuming that single periodic deflections are first observed (Fig. 14, Pos. 1), the coil is moved around the cable to a neutral point for the alternate minute interval, which is a point where the galvanometer deflections are a zero value (Pos. 2). The coil is held at this point until the double deflections are observed and the magnitude of the double deflections are noted. The coil is then moved 180 degrees around the cable to the other neutral point for the single deflection period (Pos. 3), and held at this point until the double deflections are observed, and the magnitude of the double deflections is noted. The neutral point, at which the magnitude of the double deflection is the greater, is the point on the cable sheath directly over the "B" phase conductor (Pos. 2). This point on the sheath is stamped with the letter "B" by means of 5/8-in. stencil (Fig. 14-A).

The accuracy of the position of the phase conductor selected may be checked by placing the exploring coil on each side of the "B" stencil. A decrease in

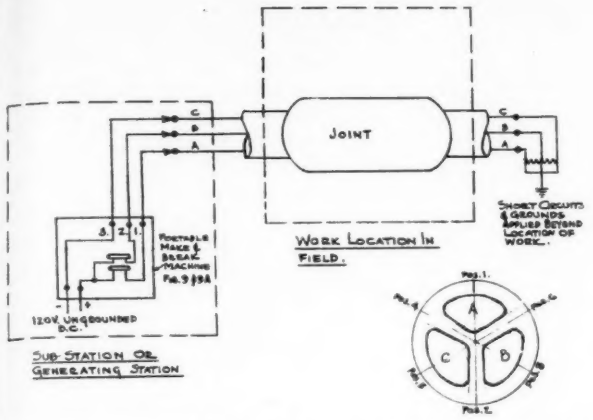


Fig. 12—Phase Selection by Means of "Continual Action" Tracing Current.

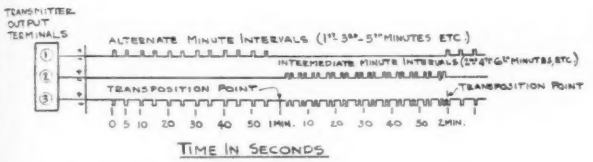

TRANSMITTER OUTPUT TERMINALS
ALTERNATE MINUTE INTERVALS (1ST, 3RD - 5TH MINUTES ETC.)
INTERMEDIATE MINUTE INTERVALS (2ND 4TH 6TH MINUTES, ETC.)
TRANSPOSITION POINT
TRANSPOSITION POINT
0 5 10 20 30 40 50 1 MIN. 10 20 30 40 50 2 MIN.
TIME IN SECONDS

Fig. 13—Wave Form for Individual Action Tracing Current Using Two Tubes.

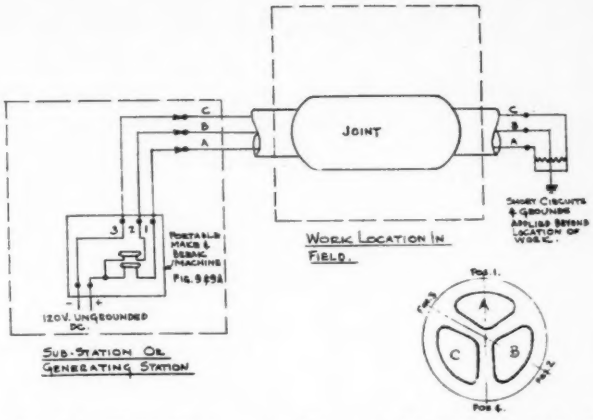


Fig. 14—Phase Selection by Means of "Individual Action" Tracing Current.

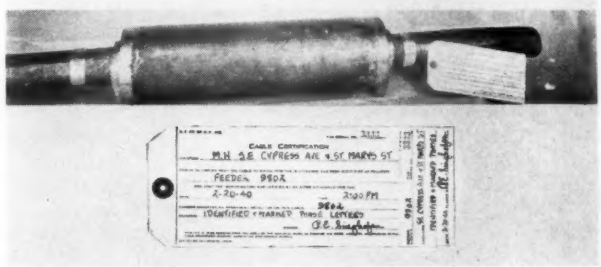


Fig. 14A.

the magnitude of the double deflections will be observed on the galvanometer, which will indicate that the "B" stencil is directly over the "B" phase conductor. If, however, position No. 3 is selected as the position of the phase conductor and the exploring coil placed on each side of this position, an increase in the magnitude of the double deflections will be observed on the galvanometer when the exploring coil is moved toward position No. 4, and a decrease of the double deflections will be observed on the galvanometer when the exploring coil is moved toward position No. 1.

The coil is again placed on the cable and when double deflections are observed, the coil is moved around the cable to a neutral point for the intermediate minute intervals (Pos. 4). The coil is held at this point until the single deflections are observed and the magnitude of the single deflections is noted. The coil is then moved 180 degrees around the cable to the other neutral point for the double deflection period (Pos. 1) and held at this point until the single deflections are observed and the magnitude of the single deflections is noted. The neutral point, at which the magnitude of the single deflections is greater, is the point on the cable sheath directly over "A" phase conductor (Pos. 1). The position of "A" phase may be stamped on the sheath and the accuracy of the phase conductor checked in the same manner as for "B" phase. In practice, it is satisfactory to determine and mark the position of only one phase, either "A" or "B," on the cable sheath near each wipe of the joint. If the position of "A" phase conductor is marked on the cable sheath, then the position of "B" phase on the cable sheath, with respect to "A" phase, is determined but not marked. A band stencilled "A-B-C" (Fig. 14-A) is then attached to the cable to indicate the phase rotation of the conductors within the cable. After the cable is grounded and when splicing operations are to start, the joint sleeve is removed and the conductors are exposed. The identity of the conductors in the joint can readily be determined by tracing the conductor to the phase letter marked and the phase letter band on the cable.

The Individual Action Tracing-Current method of cable identification and phase identification has been used successfully since 1936 and during this period there were approximately 30,000 phase selection tests made.

This method has definite advantages over the earlier methods. The phase identification may be made at the same time the cable is identified, with either three - conductor or single - conductor cable, without the removal of the joint sleeve on three-conductor cable and without the consideration of the electrical direction of the tracing-current source with respect to the location of work. However, its most important advantage is the resultant economy obtained in the operation of the underground system.

With the earlier methods of phase selection, it was essential that the splicing group work in close cooperation with the testing group. There resulted considerable unproductive time for the splicing group, since spljcing operations could not start until the particular cable had been identified at all work locations and the necessary ground protection provided.

With the Individual Action Tracing-Current method of phase selection, all cable identification and phase identification tests are performed by the testing group without requiring aid from the splicing group. To obtain the full economical advantage of this method, the cable is removed from service far enough in advance of the time that the splicing operation is to start to allow sufficient time for the completion of the cable identification and phase selection tests and the application of protective grounds.

Forgotten Men of Power History

(*Continued from page* 498)

$720,000 to $1,080,000 on September 24, 1883.

Of the original $300,000 stock, $50,000 was issued for cash and $250,000 was "issued in payment for property necessary for the business of the Company, purchased by Trustees," prior to January 16, 1879, according to the first annual report. Cash received from stock subscriptions was from time to time augmented by loans from stockholders, as in 1880 when $78,225 was obtained in this way, according to Fabbri's report of November 11, 1880; these loans were afterward paid for by certificates of indebtedness exchangeable for stock.

Expenditures prior to January 20, 1879, noted in the company's first annual report, included the following:

Expenditures Account of Special Fund (*)	
Expenditures, Chemicals, etc.	$ 6,779.01
Patent fees and expenses U. S. and Canada	641.00
Engine, Boiler, Pump & Dynamo Machines	6,505.69
New Shop and Boiler House	7,369.71
New Office	1,983.19
Books	65.44
Dynamo Machine	87.47
Dynamometer	28.13
Edison Dynamo Machine	153.68
Resistance Measurer	29.10
T. A. Edison	245.00
Total to Jan. 20th (1879)	$23,914.42

Expenditures for Company Account	
Telegrams to South America	$ 767.41
Spanish Translations, Specifications, etc.	150.00
Porter, Lowrey, Soren & Stone Disbursements	183.57
Porter, Lowrey, Soren & Stone Disbursements	139.40
Petty Cash	100.00
E. N. Dickerson, Retainer	500.00
Books and Stationery	107.60
Insurance Premium	100.00
Secretary	1,000.00
Total to Jan. 20th (1879)	$3,047.98

(*)As defined in the company's annual report for the year 1879, the Special Fund represented a sum "appropriated by the Contract between Mr. Edison and the Company to be expended under the direction of Messrs. Lowrey & Banker for the perfection of Mr. Edison's inventions."

From its organization until November 11, 1879, the Edison Electric Light Company spent $42,869.41 "for the perfection of Mr. Edison's inventions," the cash being provided by the $30,000 Special Fund, as defined above, and $12,869.41 of other company funds.

Fabbri reported these expenditures as follows in his treasurer's report, addressed to Norvin Green, president, on November 11, 1879:

New Shop	$ 7,717.32
New Office	3,158.34
Machinery and Fixtures	6,656.55
Patents, fees and expenses	1,617.80
Books	499.37
Dynamo Machines	2,435.33
Dynamo Meter	296.78
Resistance Measurer	29.10
Chemical Laboratory	1,355.00
Galvanometer	47.29
Experimental a/c chemicals, etc.	16,400.22
Platina a/c	2,411.31
T. A. Edison	245.00
Total	$42,869.41

Other company expenditures in the same period included the following:

Patents, fees and expenses in South America and Mexico	$ 2,409.20
General Office and Legal Expenses and Salaries	4,545.04
	$ 6,954.24
Total "Special Fund" and other expenditures, listed above	$49,823.65

These $49,823.65 expenditures left "in the hands of the Treasurer" but $176.35 remaining from the $50,000 stock subscription cash receipts. "Bills to the amount of $718 remain outstanding unpaid," Fabbri reported. From this statement it would appear that the loans from stockholders, noted above, began shortly afterward, for the Company's funds were exhausted, there remained no stock subscriptions to be called in and the first capital increase was not to follow until November 30, 1880.

A year later, on November 11, 1880, Fabbri reported "Receipts and Expenditures of the Company from its organization to the present date" as follows:

The Receipts of the Company have been		
From Subscriptions to Capital Stock		$ 50,000.00
From Loans from Stockholders		78,225.00
Expended		
For Experiments at Menlo Park, including Engine, Machinery, Dynamo machines, lamps, wires, etc., for model circuit		100,437.74
Patent fees and expenses		
South America	$2,397.95	
Mexico	11.25	
U. S. and Canada	6,277.15	8,686.35
General and Office Expenses and Rent		2,312.03
Salaries		6,500.00
Legal Expenses		1,625.00
Woodward Patent		1,850.00
Taxes		140.09
Total Expended		$121,551.21
Balance. Cash on Hand		$ 6,673.79

Organized "for the purpose of paying the expense of Mr. Edison's experiments touching electric light, heat and power," to quote its annual report for 1882, the Edison Electric Light Company held on to its ownership of electric light invention patent rights throughout its history. Under contracts which assured dividends and royalties, it permitted other companies to conduct the actual business of manufacturing electrical equipment and of operating Edison lighting enterprises. Roughly speaking, its "subordinate companies," to employ a term then widely used, included the Edison manufacturing companies, with whom it was linked by contract; its own stock-controlled subsidiary, the Edison Company For Isolated Lighting, to which it turned over both isolated and central station business; and the Edison Illuminating companies, in which it obtained substantial stock ownership in return for license contracts. The extent of its stock holdings in lighting enterprises is suggested by the fact that on November 1, 1889, it owned "a total nominal amount of $68,500 in bonds and $1,671,120 of stocks" of local illuminating companies, according to the Edison General Electric Company's annual report of January 2, 1890.

Pole Top Resuscitation

(*Continued from page* 512)

for reporting may be obtained from EEI headquarters. Attention is directed to the data requested especially in Section III which concerns the physiological aspects of the case and which are so important.

Any efforts that can be put forth by the members of this section in bringing this matter to the attention of the proper representatives of light and power companies, electric associations and others who can contribute through rendering reports will be greatly appreciated and will further the work of the investigation that the EEI Accident Prevention Committee has initiated and which I know has the enthusiastic support of this section.

EDITOR'S NOTE: At the conclusion of his paper Mr. Smith, as a member of the Committee of Judges, Edison Electric Institute Prize Awards Committee, called the attention of all members of the Section to the fact that the Edison Medal of the Edison Electric Institute is now available to employees of all privately owned and operated electric light and power companies whether or not they are members of the Edison Electric Institute. All such companies should, therefore, apply for this medal in cases of resuscitation from electric shock. The National Safety Council has indicated its agreement with this procedure and its President's Medal will be available to all others who do not come under the above classification.

Mr. Smith also stated that cases in which the Pole Top method is used will receive consideration.

How 'm I Doin'?

By Dr. Morris S. Viteles

Philadelphia Electric Company

Courtesy, U. G. I. Circle

ONE of the fundamental distinctions in human conduct is that between "knowing" and "doing." Although knowledge is basic to correct performance, knowledge of how to do a task is in itself no guarantee that the task will be well done. Because of this, job training, as valuable as it may be, is in itself no panacea for insuring satisfactory and safe performance on the job. Trained men, who know how to do the job, still require stimulation and leadership to encourage the transformation of knowledge about the job into effective and safe practices on the job.

The self-audit plan described in this paper, used in connection with the Job-at-Hand Training Program of the Philadelphia Electric Company, represents a promising method for helping to convert knowledge into action. The fundamental idea behind this plan is that even the man who knows how to do the job, and who is eager to do it well, frequently slips into careless or neglectful ways of doing the job without becoming aware of the change in working habits which has taken place. The functions of the self-audit plan are to direct the man's attention towards his own work; to encourage him to review his own working practices and to correct any faults which he discovers in them through the use of self-audit check sheets.

The viewpoint underlying this approach can be illustrated by reference to what happens to driving habits. Every man, when he first learns to drive a car, makes a solemn oath that he will do everything possible to drive it safely. He therefore starts by carefully signalling other drivers before making a stop; by refraining from passing other cars on the crest of a hill, and otherwise adhering to safe driving practices.

Slowly, with the passage of time, a change occurs in the driver's operating habits. He starts taking the inside lane at corners which seem safe; to pass cars close to the top of a hill, and so on. These changes take place so slowly that the driver is unaware of the fact that he is casting off fundamental cautions in driving.

One day, the driver barely avoids an accident in cutting a corner or passing a car at the crest of a hill. As a result, he suddenly becomes acutely conscious of the fact that he has been taking chances for many days. Having become aware of this, and still shaken by the near-accident, he again returns to his earlier and safer driving habits.

Everyone will recognize that this is a fair description of what happens to many drivers. There is good reason to believe that a periodic check of driving practices by the man who operates a car can do much to prevent him from unconsciously slipping into faulty and dangerous operating habits responsible for serious as well as near-accidents.

What has been said of driving also applies to working practices on the job. Having been taught and having practiced the correct methods of work, the employee does not consciously and willingly undertake to use other than correct and safe methods of work. It seems reasonable to believe that a man who, through the use of a self-audit check sheet, systematically and conscientiously reviews his working methods, and discovers a tendency to shortcut or neglect efficient and safe practices, will be more than willing to return to the better methods of work.

The general character of the self-audit program is illustrated in that used by the Appliance Service Division. This calls for the distribution, once a month, for each of three months, of a self-audit check sheet with questions covering automobile operation, customer contacts, dispatching procedures, conduct on customer premises, and other work practices. These monthly self-audit check sheets will be followed, at the end of six months, by a general self-audit check sheet reviewing all of the practices covered in the three sheets issued at monthly intervals. The general purposes of the self-audit program are described in a covering letter, sent to each employee with the first of the self-audit check sheets by the general superintendent of the Appliance Service Division. In this, the letter emphasizes the self-corrective and confidential nature of the self-audit check sheet:

"The attached check sheet," writes the general superintendent, "can be used by you to determine whether you are 'slipping' on any detail of your job, thereby giving you an opportunity to correct anything in your operating habits which is in need of correction.

"This self-audit sheet is intended for your own information and for your own use only. You will not be requested to show it to any of your associates or superiors and it need not be discussed with them. You may destroy this sheet when it has served your purpose. All that we ask is that you try it and that you play fair with yourself as you consider each of the items included in the questionnaire."

Extensive use is being made of self-audit procedures by the Station Operating Division, Transportation Division, Stores Division and, in various units of the Gas Operations Department of the Philadelphia Electric Company. In addition to its use in specialized job situations, the self-audit program has been extended to cover approximately 2500 employees operating company cars, or authorized to operate their own cars on company business.

One of the chief advantages of the self-audit technique is that it is applicable to practically every kind of work operation and on almost every kind of job. For example, in the self-audit program developed for the Appliance Service Division practices covered by check sheets include those used in handling customers as well as those of the manual type. In earlier training program, the self-audit plan has been employed in helping receptionists and customers service employees to review their habits with respect to the maintenance of good appearance as well as with respect to procedures used in handling customers. Not only is the self-audit program applicable to a large variety of work activities; it has the additional merit of being inexpensive to operate.

It is apparent that all the self-audit program does is to encourage each man

	1	2	3
1. Do I make sure that vehicles jacked up for repairs have proper support?			
2. Do I use goggles whenever necessary?			
3. Do I check hammer handles to make sure that the head is sufficiently tight before using?			
4. Do I select the proper and safe tool for each job?			
5. In using the chain hoist, do I make sure that the hook is heavy enough for lifting the load safely?			
6. Do I safeguard against both fire and personal injury when using torches?			
7. Do I take care in lifting heavy material so as to avoid strain or injury?			
8. In using the chain hoist, do I make sure that the hook is securely fastened?			
9. In changing large tires do I make sure that the tire is properly seated in the bead?			
10. Do I refrain from leaving tools around where they can be tripped over?			
11. In using the chain hoist, do I center the hoist over the load?			
12. In changing large tires of the lock ring type, do I make sure that the lock rings are properly installed?			
13. Do I replace tools where they belong after they have been used?			
14. In using the drill press, do I always carefully clamp the material to the table of the drill press?			
15. In using the drill press do I make sure to select the proper speed for the operation to be performed?			

A typical self-audit check sheet (Reverse side)

to ask himself the question "HOW 'M I DOIN'?" and to urge him to answer this question in an honest and straightforward manner. Because the check sheets are not collected, there is no way of knowing (a) what percentage of the workers do as they are asked to do; (b) whether they make an honest attempt to answer the questions truthfully, and (c) whether they act upon the questions after they have been answered.

In spite of this, there seems merit in using the self-audit plan, primarily because it is based upon fundamentally sound assumptions:

(1) The first of these is that every normal man likes to know how he is doing. The popularity of "Information, Please," and similar radio programs attest to this fact. There is reason to believe that people listen to this program not primarily to learn something new, but to check their information against that of the "experts." The greatest satisfaction in listening to such a program comes not from picking up a new fact, but from being able to answer a question which "stumps" the expert. It is believed that this curiosity concerning oneself will apply to a quiz concerning one's job as well as to a radio program, and will lead the employee to answer a few simple questions concerning his working habits with a view of finding out how he actually stands with respect to his working practices.

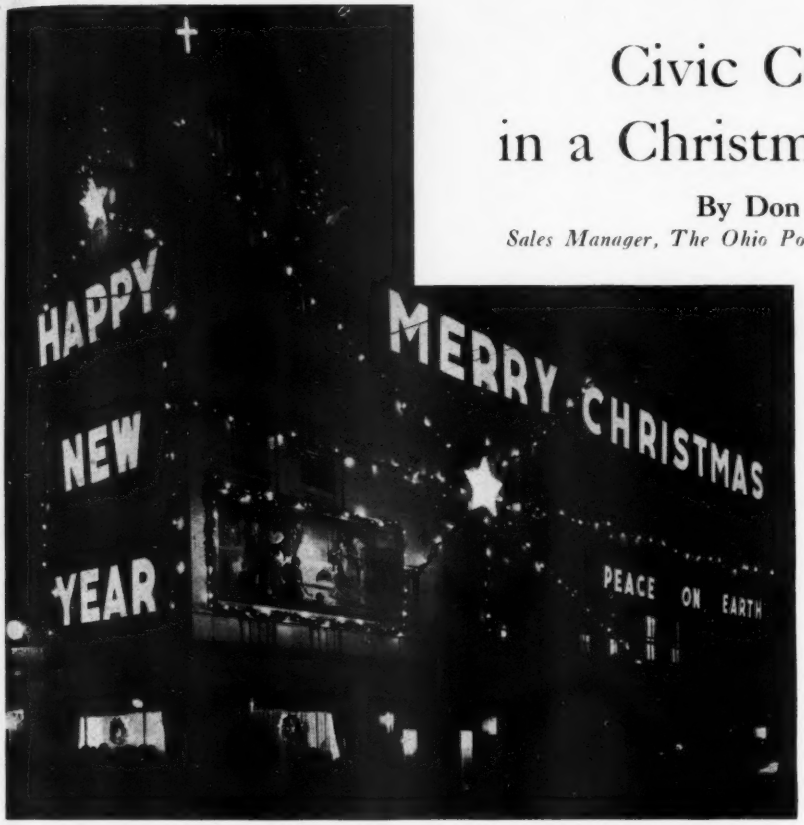
(2) The second assumption is that having discovered faults in their working practices, men will make an honest effort to correct them. Underlying this assumption is the belief that men are fundamentally interested in doing a good job—that one can safely place dependence in the worker's desire to do a good job as a positive force for efficient and safe work. The self-audit procedure is designed to give each man the information he needs as a basis for correcting faults in his working practices.

(3) The third assumption is that the man who knows that he is doing well will attempt to do even better. Experiments in the psychological laboratory merely confirm what the skilled foreman in industry already knows, that knowledge by the man of results obtained during work tends to improve performance on the job. From the self-audit check sheet the man on the job obtains that information about his own performance which, in itself, constitutes an incentive to better performance. In addition, this self-knowledge furnishes a stimulus for the exercise of creative effort in finding even new and better ways of doing the job safely and well.

Such are the assumptions underlying this self-audit program. Devices for stimulating workers to efficient and safe performance on the job include procedures ranging from cajolery to threats; from an emphasis upon fear of discharge to promise of promotion; from suspension to the award of pleasure trips; and so on. Among them are the negative procedures which surround the worker with a wall of discouragement and those which provide positive encouragement to the man at work to participate with others in doing a job well. The experience of practical foremen and supervisors has clearly shown that although effort can be induced for a time by both negative and positive influences, long-continued effort, such as is called for in modern industry, can be kept at a high level of efficiency and safety only by the positive urge. The self-audit plan has the distinct advantage of furnishing such positive stimulation to good performance. It tends to place responsibility for such performance where it belongs—on the man at work, and to encourage active effort on his part to live up to this responsibility.

A price list
of
E.E.I. publications
will be sent upon
application to

EDISON ELECTRIC INSTITUTE
420 Lexington Ave., New York, N. Y.



Civic Cooperation in a Christmas Celebration

By Don E. Neely
Sales Manager, The Ohio Power Company, Zanesville, Ohio

THIS article outlines a definite plan that has been adopted by The Ohio Power Company of Zanesville, Ohio, and has been received with such universal approval that it has now established itself as a permanent civic affair and is recognized far beyond the limits of the city.

The plan is known as the Zanesville Civic Christmas Program and was conceived and produced by the writer.

In order to fully understand the project, it should be said that the plan was born through necessity and originated in the following manner:

Two years ago in the late fall, the members of the Board of Directors of the Zanesville Retail Merchants Association met to decide on some method of ushering in the Christmas buying season to people of the vicinity. Many promotions had in the past been used, and it was apparent that a need for something different was urgent.

The plan, about which this article is written, was then introduced for consideration. Briefly, it was explained that the Retail Merchants Association was invited to join with The Ohio Power Company in a strictly non-commercial celebration of Christmas. It was further outlined that for a period of two weeks prior to Christmas, the power company would turn over to the merchants their entire front lobby, and at a period in the evening after all stores were closed, a religious program of carols and hymns would be broadcast onto the down-town streets from the lobby windows.

For a utility company that is actively engaged in merchandising electrical appliances to clear their entire front lobby of all merchandise during the two best weeks in the year is one thing; but for the retail merchants to accept a strictly non-commercial venture as a substitute for any project intended to increase business is another. However, the merchants did accept the proposal, and preparations for the program started immediately.

Certain expenses would have to be met by both organizations, so it was agreed that the power company would decorate their building exterior befitting the program and provide a studio inside their large front windows suitable for broadcasting the choral programs. In return, the merchants agreed to furnish, through rental, an electric organ to be installed in the windows, and also such public address equipment necessary to amplify the music. By Dec. 10, the power company had constructed and erected their decorations as they appear in the accompanying photograph.

The large replica of a pipe organ on top of the building stood sixteen feet high and was illuminated with a battery of ever-changing color-wheels and floodlights. The illuminated letters were controlled by a rotary flasher switch and spelled out the message—"Merry Christmas—Happy New Year—Peace on Earth."

The large picture of "The Nativity" on the side of the building was illuminated by a 1500-watt floodlight mounted on a street lighting pole from across the street, while the giant "Star of Bethlehem" shed its rays of yellow light onto the picture.

Strings of colored lights emanating from the Star completed the display.

The Retail Merchants, according to their agreement, secured an electric organ and had it installed in the lobby windows. Likewise, they secured an elaborate public address system which included microphones and speakers. This was installed in the lobby with lead wires running to the roof, where four speakers were mounted, while other circuits were extended down the main streets where additional speakers were installed to cover the business district.

The committee realized from the first that such a project could not properly be presented to the people of the community without the spiritual guidance and assistance of the churches. Recognizing this, the Muskingum County Ministerial Association had been asked to cooperate by providing vested choirs from their various churches to appear nightly in the power company's window, where they would present a program of Christmas carols and hymns. The association was also asked to secure the services of the ministers of the churches to

appear with the choirs and read passages from the Scripture, interspersed throughout the program.

The Ministerial Association wholeheartedly approved of the project and expressed gratification of the fact that business men and the churches could join hands in celebrating the Christmas Season in the true Christian spirit.

A committee of ministers was appointed and arranged a schedule of representative choirs. It is quite fitting to note that true to American doctrines, churches of all denominations, colors, and creeds were represented in the series. Colored church choirs combined to present a program of characteristic negro spirituals. Another outstanding group to appear was the Girls' Choral Club of St. Nicholas Church, a Catholic organization directed and accompanied at the organ by nuns of the church.

Non-sectarian groups were likewise recognized by the committee. The sixty voice a cappella choir of Muskingum College, New Concord, Ohio, opened the series, whereas The Thursday Music Club, composed of the finer voices in the locality, closed the series with the presentation of Handel's "Messiah."

The choral singing and organ music, emanating from the power company's window and amplified over the public address system, was of such high quality that thousands gathered on the downtown streets to listen to the nightly broadcasts. No matter how heavy the traffic noises were or how hurried were the shoppers in their last minute rush, when the recorded music of Westminster Chimes pealed out into the night air announcing the opening of the evening concert, followed by "Silent Night," the adopted theme song, it seemed that time itself stood still. Men held their wives' arms just a little tighter, while others bared their heads to the falling snow flakes in silent prayer, as the Christian voices of their church sang the praises of the birth of Christ.

The large attendance at the nightly broadcasts was due, in part, to the loyal support given by the newspapers of the locality. Daily front page articles, editorials, and Sunday features kept their readers informed of the programs and other events pertaining to the services. Their enthusiasm can best be expressed by quoting excerpts from a letter received from the advertising manager of one of the newspapers, "The curtain has been run down on the most remarkable piece of community cooperation it has ever been my privilege to witness . . . and is something no one in this community will ever forget."

Scores of letters, hundreds of complimentary remarks, and a general and lasting feeling of good will is evidence of the universal acceptance and approval of the program. Wrote the minister of one of the city's leading churches, "It is gratifying to see a large company put aside commercialism and help to emphasize the things that really count." While the Honorable Tom V. Moorehead, Mayor of the City of Zanesville, wrote in part, "On behalf of the City, I want to extend to you our good will and appreciation of what you are doing to keep Zanesville in the forefront of progressive and civic-minded cities."

Although the Christmas program was presented on a strictly non-commercial basis, it is interesting to note that new high sales records were reported by leading representative stores in the city.

Commenting on the Christmas Program, a manager of one of the larger department stores writes, "HERE IS THE INSIDE STORY . . . of the effect your Christmas Program had on our business. In December of 1939 our sales reached a new high, and we attributed much of this to your program which created the Real Christmas Spirit in the hearts of the people of Zanesville. In July when our auditor asked us to set up a quota for the last six months of the year, we anticipated an increase for each month except December, as we felt certain we could not beat last year's figures, but in July we did not believe it possible for you to create a bigger and better Christmas Program than you produced in 1938. Your 1939 program was in our opinion much better than the year before, and we know that it was this program that enabled us to beat our last year's sales."

It is felt that the Christmas Program culminated in a closer association of the business man and the church, resulting in a better understanding of each other's problems. The cooperation that they have enjoyed during the presentation of the Christmas Programs has continued and prospered. As stated by a member of the Retail Merchants Association, in a letter to The Ohio Power Company, "During the past few weeks, the Retail Merchants Association has received letters from the ministers of several different churches thanking us for the splendid Christmas Program which you were responsible for. One minister stated that the team work of the ministers and merchants during the Christmas Program led him to select members of our association to lead their "Go to Church" campaign, which by actual check increased their attendance 20 per cent last Sunday. It is really remarkable the wide effect this program has had on this community. Indirectly you are responsible for a 20 per cent increase in church attendance last Sunday in addition to the good will gained for your company, the Ministerial Association, and the Retail Merchants Association. We sincerely thank you."

So, a mole hill has grown into a mountain. What started as a commercialized announcement of the Christmas buying season, has grown to a city-wide civic project in which people of all classes, colors, and creeds have joined hands in solemn reverence of the occasion, wishing each other a "Merry Christmas"—"A Happy New Year"—and a prayer for "Peace on Earth."

The Ohio Power Company is proud of its part in the Zanesville Civic Christmas Program. "Their contribution," as told by a minister to his congregation, "has endeared themselves by their actions to the people of Zanesville as an institution eager to serve the community for the best interests of everyone." What greater reward could any company attain than to be the subject of such complimentary remarks from a church pulpit.

CHRISTMAS SEALS

Help to Protect Your Home from Tuberculosis

"Alice in Electric Wonderland" Scores Big Hit

THE new Broadway shows may be getting more New York metropolitan newspaper attention, but away from New York City it is the Modern Kitchen Bureau's *Alice in Electric Wonderland* which is causing excitement in the local newspaper offices and among the townspeople.

"Alice" has proved the season's sensation wherever she has appeared. The play has proved a remarkable combination of entertainment, education and sales promotion before every audience that has seen it. Almost everywhere it has been produced the demand has called for additional productions, and in each case where extra performances have been given the audience has grown steadily with each appearance.

Numerous adaptations of the play have been given. In more than fifty cases it has been staged under the auspices of the local electric utility. In Portland, Oregon, the play was presented five times by one of the city's leading department stores, in cooperation with Portland General Electric Company and Northwestern Electric Company. In Chicago the local branch office of Westinghouse Electric & Manufacturing Company cooperated in putting on the play with Commonwealth Edison Company, as a feature of its Electrical Living Exposition.

At Indianapolis the play was incorporated into a play presented by the Amateur Chefs of America, in which famous men in various walks of life participated. In Washington, D. C., the Electric League of Washington staged "Alice" under the direction of Miss Bernice Burns, the League's Home Economist. In Minneapolis it was the North Central Associated Electrical Industries which staged a highly successful series of performances. From dozens of other communities similar reports have been received.

One of these reports, from Willimantic, Connecticut, provides a splendid

(*Continued on page* 536)

This audience at Willimantic, Connecticut, performance of "Alice in Electric Wonderland" is typical of those throughout the country. Cast of Willimantic performance (above) was recruited from local high school by Miss Dorothy Sherlock, Home Service Representative.

Power Supply for Welding Operations

Final Report of A.I.E.E. Subcommittee is Completed

"FACTORY Wiring for Resistance Welders," the third and final report of the A.I.E.E. subcommittee on power supply for welding operations has been completed and will shortly be available, L. W. Clark, Detroit Edison Company, informed the Electric Equipment Committee, E.E.I., at its meeting at Richmond, Oct. 7 and 8. The report contains tables and charts which should prove of value to the factory engineer when installating factory wiring for welder installations.

It is suggested that companies desiring copies of the report, both for their own use and for distribution to interested customers should order them direct from Mr. Clark at Detroit.

In reporting on the work of the A.I.E.E. subcommittee, Mr. Clark said:

"The two earlier reports of the Committee, 'I. Guide to Good Electrical Performance of Resistance Welding Machines' and 'II. Resistance Welder Installations,' were made available in reprint form early this year and over 5000 copies were purchased by 30 different companies, twenty-one power companies ordering an average of 150 copies each and nine manufacturing companies an average of 250 copies each. We believe this insures a good distribution of the reports which should result in a better understanding by all concerned of the different phases of the power supply problem.

"The first report recommended that each welding machine be provided with a name plate showing certain essential data concerning the complete machine in addition to the transformer name plate which heretofore was the only one provided. The Resistance Welder Manufacturers Association have adopted this recommendation substantially as it was given in the report and as nearly all resistance welder manufacturers belong to the Association, adequate name plate data should now be available on all new machines.

"It should be remembered that the kva rating given on the name plate is the kva rating of the welding transformer on a 50 per cent duty cycle basis and is no indication of the possible maximum kva input to the machine. In addition to other essential facts, the name plate states the short-circuit secondary current that the welder will deliver when operaing at its highest secondary voltage with a given throat and gap dimension. It also gives the maximum and minimum open-circuit secondary voltages. In order to obtain the maximum volt-ampere input to the welder for the specified throat dimensions, it is only necessary to multiply the maximum secondary open-circuit voltage by the corresponding short-circuit secondary current. This is the value upon which the power companies should base their voltage drop or flicker calculations.

"Purchase inquiry forms and manufacturers' data sheets have been completed and will be turned over to the Resistance Welder Manufacturers Association. These sheets outline in detail all essential information that the prospective user should furnish both the manufacturer and the local power company. The manufacturers' data sheets list the corresponding data that the manufacturers should make available to the prospective purchaser as well as the local power company. It is the recommendation of the subcommittee that the Resistance Welder Manufacturers Association adopt and use these forms, thus making the data needed by the power companies on prospective installations much more readily available.

"The subcommittee has also prepared recommended changes to the National Electrical Code covering fusing and wire sizes for welder installations. At the present time no special mention is made in the Code regarding resistance welders and it is sometimes difficult to properly interpret the rules which were drawn up primarily for motors in such a way that they can be applied to welders. It was felt that in order to avoid possible misinterpretations, it would be desirable to include specific rules for resistance welder installations.

"In an earlier report to the Electrical Equipment Committee we mentioned the French Sciaky welder which is of the stored energy type and particularly desirable from the power supply standpoint. The Taylor-Winfield Corporation are now manufacturing a somewhat similar machine which they call their "Hi-Wave" welder and so far have made fifteen or twenty of them for aluminum welding. It has a maximum demand of only 50 kva, three phase and is capable of welding two pieces of ⅛-in. aluminum at the rate of 30 spots per minute. The conventional single-phase welder on similar work would have a single-phase demand between 300 and 500 kva. While the use of this type of machine has been confined to the welding of aluminum, there is no reason why it would not be equally adaptable to other metals and should receive consideration at those locations where the cost of an adequate power supply for the conventional machine is prohibitive."

Standardization of Distribution Transformers

Joint Committee Nears Completion of Specifications for Larger Pole Types

THE EEI-NEMA Joint Committee on Standards for Distribution Transformers held its 18th meeting on November 14. The Committee has now completed major features of the second step of its program which includes single-phase pole type transformers rated 100 kva and below. This second step extends the standards set up in the First Report issued in February, 1940, covering transformers rated 25 kva and below.

The manufacturers stated at this meeting that they are now producing the new EEI-NEMA standard transformers of 25 kva and below in increasing numbers and will be prepared to make deliveries when the new transformers are placed on a catalogue basis at revised price levels in January.

Several manufacturers reported shipment of preliminary orders of new transformers built in accordance with the First Report of the Joint Committee which will serve to familiarize operating forces with the various features of the new units and to educate them in handling and mounting practices. Recent cases were cited in which larger companies had studied the new transformers and found them to be suitable for their needs.

Direct pole mounting has been one of the major and most successful factors in reducing costs and improving appearance of rural lines and there is now evidence of a widening realization that the same economies are readily obtainable by omission of much of the habitual cross-arm hanging in urban construction.

Accident Prevention Committee Meeting

W. R. Smith, *Chairman*

THE Accident Prevention Committee held its 15th meeting at Institute Headquarters on October 24 and 25, 1940, with sessions morning and afternoon. All meetings were well attended.

The morning session on Thursday, October 24, was devoted to the reports of subject sponsors. Mr. J. E. Goodale in his report on "Accident Statistics" indicated trends that are very encouraging on the basis of information for the first eight months of 1940 from companies represented on the committee.

The summary of the data on "Cause and Location of Accidents" for the years 1938 and 1939 shows that by far the largest percentage of disabling accidents in the industry, as represented by Institute member companies, is still to be found in the overhead lines division. Employee practices account for more than 50 per cent of such accidents and the fatalities and days lost which are a consequence thereof. More intensive training and the establishment of correct work practices for both new and old operations seem to be suggested as means of reducing accidents of this type to a minimum. The committee contemplates a thoroughgoing study of such accident statistics to the end that in the near future it may be in a position to present a report to Institute member companies that will be helpful in this general connection. The cooperation of all member companies will be solicited in connection with an effort toward a classification of

Accident Prevention Committee in session at the general office of the Institute, Oct. 24.

Left to right—
F. H. Davies, Detroit Edison Co.
W. T. Rogers, Ebasco Services, Inc.
H. F. Webb, West Penn Power Co. (*)
Ralph A. Bloomsburg, Niagara Hudson Power Corp. (*)
E. A. Holden, Ebasco Services, Inc.
H. J. Burton, Consumers Power Co.
Geo. S. Diehl, Pennsylvania Water & Power Co.
H. O. Sprinkle, Monongahela West Penn Public Service Co.
R. M. Godwin, Philadelphia Electric Co.
Dr. H. B. Williams, Chairman Resuscitation Review Board (*)
Dr. W. B. Kouwenhoven, The Johns Hopkins University (*)
E. W. Oesterreich, Duquesne Light Co. (*)
A. B. Campbell, Secy., Accident Prevention Committee and Acting Secretary, Resuscitation Review Board
W. R. Smith, Chairman, Accident Prevention Committee
Dr. Cecil K. Drinker, Harvard University (*)
E. J. Kreh, Duquesne Light Co.
D. C. Stewart, Buffalo Niagara & Eastern Power Corp.
C. R. Beardsley, Consolidated Edison Co.
E. C. Rue, Boston Edison Co.
J. E. Goodale, Consolidated Edison Co., Inc.
C. N. Rakestraw, The Cleveland Electric Illuminating Co.
E. W. Gorry, Consolidated Edison Co., Inc. (Retired)
E. S. Miner, A. T. & T.
John J. Barada, LaClede Power and Light Company
W. A. Buchanan, Appalachian Electric Power Co.
L. M. Shadgett, Georgia Power Company.
C. B. Boulet, Wisconsin Public Service Co.
(*) Resuscitation Review Board Member.

accidents that will make possible a report which will be of maximum interest.

A discussion of low voltage fatalities which had occurred during recent years emphasized again the importance of proper precautions being taken especially by those working in tanks, boilers or in any wet places. The committee urges a dissemination of proper information on this subject by member companies and the establishment of proper procedure in this regard for employees and information and suggestions will be furnished on request to the committee.

The disabling accidents among employees of commercial departments was found to be abnormally high in some quarters and the committee recommends an analysis of the situation in this regard by commercial department managers and which should begin with a study of how the accidents to these employees are being caused. Many of the accidents to the employees of such departments occur in streets or alleys and on customers' premises where the company has no jurisdiction over the conditions out of which arise the accident hazards. The committee suggests that following a cause study better training of personnel and more specific instructions with respect to how the employee should conduct himself will result in the employee's being able to meet such conditions with safety to himself at all times.

Several matters concerned with the safety of members of the public are constantly before the committee for consideration. Kite flying continues to be a problem in many sections of the country and news articles and other efforts to reach children, parents, and teachers are suggested. Mr. George Diehl is working on this problem for the committee and those interested can receive from him information and suggestions. The committee is most anxious to render service in connection with the electric fence situation and which has been serious in many quarters due to the use of home made and in other respects dangerous connections and devices by uninformed persons. All companies who have not made their response to the committee's communication with regard to a proposed educational sound slide film on the subject of safety on the farm are urged to do so promptly.

The afternoon session on Thursday was devoted to a joint meeting of the Resuscitation Review Board and the committee, the specific purpose of which was to have a presentation by Dr. W. B. Kouwenhoven of the results of a recent investigation made by him jointly with Drs. Langworthy and Hooker at The Johns Hopkins University into the effectiveness of the pole top method of resuscitation. Dr. Kouwenhoven showed the motion picture which had been a part of his presentation of this subject to the Middle Eastern District Meeting of the American Institute of Electrical Engineers, held in Cincinnati on October 11, 1940.*

Pole top resuscitation is shown by the investigation to be effective in the matter of the volume of air moved. The importance of beginning resuscitation promptly and within three to five minutes after the shock was emphasized in the general discussion which followed, together with a recognition of the contribution that the pole top technique has made in this regard. Copies of the report on "Developments in Pole Top Resuscitation" which Chairman Smith had made to the Public Utilities Section meeting of the National Safety Council during the recent annual congress and exposition in Chicago, and which appears elsewhere in this issue, were distributed. Concerning the work of the Resuscitation Review Board, report was made to the effect that data on electric shock cases are now coming to the Board for review and it is anticipated that much of value to the Institute and the industry will result from the study which is now getting under way. The committee again requests the fullest cooperation on the part of all member companies and other agencies with this work.

The Friday sessions were devoted to reports of the liaison representatives of the committee with other Edison Electric Institute committees and non-Edison Electric Institute agencies and to a discussion of committee work in progress, present work routine and procedure, and new developments having bearing on accident prevention. The Chairman reported that the American Standards Association Committee Z-35 has completed its work on the development of specifications for accident prevention signs and would soon get under way on the subject of tags. One very important standardization proposed is that of the use of the colors red, yellow, and green for specific purposes and the establishment of values for such colors so that there may ultimately be uniformity throughout industry. It is recommended that "red" be always used to denote "danger"; "yellow" for "caution"; and "green" employed for all other signs such as those giving information or instructions. Copies of the proposed standard can be obtained from A. S. A. Headquarters, 33 W. 39th Street, New York City.

The committee decided to hold its February meeting in Roanoke, Virginia, the dates of February 10 and 11, 1941, being tentatively selected. The May meeting will be in Chicago at the Edgewater Beach Hotel during the week of May 5 when the committee will meet simultaneously with all other technical committees of the Institute.

* Permission has been granted to the committee by A. I. E. E., and is hereby acknowledged with thanks, to include Dr. Kouwenhoven's paper in the minutes of this meeting. Copies of this paper can be obtained from A. I. E. E. Headquarters, 33 W. 39th Street, New York City, for 10c per copy. Address C. S. Rich, Secretary, Technical Program Committee.

Transmission and Distribution Committee Meeting

W. F. Nimmo, *Chairman*

THE 23rd meeting of the Transmission and Distribution Committee of the Edison Electric Institute, held at the Henry Grady Hotel in Atlanta, Ga., Oct. 14, 15, 16, was well attended both by committee members and by engineers from operating companies in the eastern and southern sections of the country.

The first day of the meeting was devoted to papers and discussions on the program of the Underground Group, of which Mr. T. G. Hieronymus is chairman. Mr. E. R. Thomas of the Consolidated Edison Company of New York, presented a preliminary draft of the 1939 Cable Operations Report and gave a résumé of the data contained in the report.

Mr. C. W. Franklin of the Consolidated Edison Company who has taken over the preparation of the usual report on underground low-voltage a-c networks, gave a summary of his plans for proceeding with the collection of these data. There had been some discussion at the meeting of the committee held in October, 1938, as to whether or not this report would be continued. It has since been decided that the collection of these data will be continued, but on a somewhat different basis. Mr. Franklin re-

viewed the proposed form for obtaining the data from operating companies, and he was authorized to proceed on the basis it represented with such changes as he deemed necessary following the discussions at this meeting.

A very interesting paper was presented by Mr. G. B. McCabe of the Detroit Edison Company entitled "Impulse Tests on Various Kinds of 4800 and 24,000 Volt Cables." It contained information based on tests made by The Detroit Edison Company on a variety of cables in the voltage classes from 4800 volts to 132,000 volts.

A progress report was presented by Mr. M. W. Ghen of the Duquesne Light Company for the subcommittee that was established last spring to study the operation of transformer equipment filled with non-inflammable liquid. The main purpose is to obtain and compile information on the operating difficulties experienced with this type of equipment. It is expected that when the subcommittee has completed its investigation, the committee report will be prepared, including as a supplement a review of the literature on this subject, with a summary of instructions issued by various manufacturers covering the installation and use of this type of equipment.

Another progress report was that of Mr. W. B. Elmer of the Boston Edison Company on the investigation of methods of obtaining cable temperatures. Mr. Elmer explained that in October of 1937 it had been planned that representatives of nine operating companies should participate in an investigation to determine the accuracy of various methods of determining these temperatures. Several of the companies have submitted data and further progress is awaiting the submission of data from the remaining companies in order that a final report may be made.

Mr. E. F. Nuezel of the Cincinnati Gas & Electric Company exhibited a motion picture film showing the construction of a submarine cable crossing. This was followed by a motion picture film presented by Mr. Wm. A. Del Mar of the Habershaw Wire and Cable Company, which showed the installation of a five-mile length of submarine cable from Falmouth, Mass., to Martha's Vineyard.

The afternoon session of the program of the Underground Group was devoted to a round-table discussion of the following subjects: (a) layout of junction manholes for low voltage AC networks; (b) restoring service on 4-kv underground radial feeders after primary fault; (c) upper limit of cable lengths for duct installation.

Several other subjects that had been scheduled for round-table discussions were deferred until a later meeting owing to a lack of time to complete the program.

The meeting on Oct. 15 was devoted to programs by the Overhead Transmission Group, the Cooperative Projects Group, the Plant Coordination Group and the Overhead Distribution Group. Full schedules had been arranged by all these groups.

Mr. J. F. Pennington of the Georgia Power Company presented a paper entitled "Reconstruction of Single-Pole 66-kv Transmission Lines for 110-kv Operation." This paper was discussed by Mr. H. B. Robinson of the Carolina Power and Light Company, who compared his experience with that outlined by Mr. Pennington. "Operating Performance and Maintenance of 132-kv Line Between Louisville and Cincinnati," was the subject of the paper given by Mr. G. M. Miller, Louisville Gas and Electric Company, of which Mr. P. B. Stewart of the Cincinnati Gas and Electric Company was co-author. This line is a single-circuit, steel tower line with two overhead ground wires and is 82 miles long.

Mr. C. E. Arvidson of the Commonwealth and Southern Corporation gave a paper on "The Diversity Demand Method of Estimating Residential Transformer Loads." This is a subject to which Mr. Arvidson has given much study, and the presentation he made brought forth lively discussion. Mr. C. C. Cornelius, Kansas City Power and Light Company, described the series system used in street lighting in Kansas City. The presentation was similar to one made at a previous meeting describing a multiple system in operation in Minneapolis, Minn.

A new subcommittee has been organized, with Mr. Arvidson as chairman, on Utilization Voltages. This is a subject which has been discussed a great deal during recent years and is of considerable importance to operating companies in the design and operation of their plants and the selection of the voltages which they expect to use in their distribution system. Mr. Arvidson presented a brief report on the work of the subcommittee and then presided while prepared discussions on this subject were given by Messrs. W. R. Bullard, Ebasco Services, Inc.; R. F. Danner, Oklahoma Gas & Electric Company; C. B. McManus, Georgia Power Company; H. P. Seelye, Detroit Edison Company, and C. C. Cornelius, Kansas City Power & Light Company.

Practically all of the forenoon session on Wednesday, Oct. 16, was given over to discussion on subjects scheduled by the Standards and Specifications Group with Mr. E. V. Sayles as chairman. Mr. Sayles outlined the work of his group in the preparation and revision of suggestion specifications and said that this work was well on the way toward completing a review of all of the specifications that had been approved by the Overhead Systems Committee of the former NELA. He spoke of two suggestions for specifications which were just being printed, TD-61 dealing with fir crossarms designated as type A, and TD-62 dealing with fir crossarms designated as type B. The type A crossarms are made from air-dried or kiln-dried West Coast Douglas fir crossarm stock. The type B is made from air- or kiln-dried depth-select structural West Coast Douglas fir. These suggested specifications have been in the process of formation for some two or three years and are looked forward to by many as a substantial contribution in the field of overhead lines standardization work.

Mr. Sayles reported for Mr. Silver on the progress being made in the standardization of distribution transformers. He spoke of the work that is being done by the Joint EEI-NEMA Committee on Distribution Transformer Standards and told of new aspects that have been considered since the first report (EEI Publication G-6) was issued last February.

Mr. L. G. Smith of the Consolidated Gas, Electric Light and Power Company of Baltimore presented a progress report for the Timber Products Subcommittee. He told of the suggestions for specifications he is preparing on transmission type crossarms and presented some material for discussion. Mr. Smith also presented an interesting report on the preservative treatment of fir crossarms, which he has been studying for several months. At the meeting of the committee held at Chicago last May, there was a lively discussion concerning the proper methods for increasing the life of fir crossarms. Mr. Smith's report was intended to contribute to the information on this subject by giving a comparison of the penetration of creosote in fir crossarms treated by different processes.

Mr. Smith also gave a report on the

(*Continued on page* 536)

Personnel of E. E. I. Sales Committees

The personnel of all sales committees of the Institute with the exception of the General Sales Committee, which was published in the October issue of the BULLETIN, *follows:*

AIR CONDITIONING COMMITTEE

Chairman, H. H. MATHER, Philadelphia Electric Co., Philadelphia, Pa.
E. A. FREUND, Union Electric Co. of Missouri, St. Louis, Mo.
E. W. GRAY, Oklahoma Gas & Electric Co., Oklahoma City, Okla.
A. D. MARSTON, Kansas City Power & Light Co., Kansas City, Mo.
C. H. RANDOLPH, Wisconsin Electric Power Co., Milwaukee, Wis.
DANIEL RICKER, Boston Edison Co., Boston, Mass.
S. S. SANFORD, The Detroit Edison Co., Detroit, Mich.
J. DEB. SHEPARD, Consolidated Gas, Electric Light & Power Co., Baltimore, Md.
R. H. TEN EYCK, Consolidated Edison Co. of New York, Inc., New York, N. Y.

ELECTRIC WATER HEATING COMMITTEE

Chairman, C. J. STRIKE, Idaho Power Co., Boise, Idaho.
R. S. BELL, The Commonwealth & Southern Corp., New York, N. Y.
R. C. BRYCE, Philadelphia Electric Co., Philadelphia, Pa.
A. V. S. LINDSLEY, Connecticut Light & Power Co., Waterbury, Conn.
L. F. RIEGEL, Gulf States Utilities Co., Beaumont, Texas.
C. M. TURNER, Ebasco Services Inc., New York, N. Y.

FARM SALES COMMITTEE

Chairman, F. A. COFFIN, Wisconsin Electric Power Co., Milwaukee, Wis.
MICHAEL A. CAFFREY, Brockton Edison Co., Brockton, Mass.
R. K. DERRY, Ohio Power Co., Canton, Ohio.
R. T. DUNCAN, The Detroit Edison Co., Detroit, Mich.
E. C. EASTER, Alabama Power Co., Birmingham, Ala.
L. W. GRAY, Georgia Power Co., Atlanta, Ga.
R. E. HAYMAN, Oklahoma Gas & Electric Co., Oklahoma City, Okla.
CARL E. JEERINGS, Rochester Gas & Electric Corp., Rochester, N. Y.
R. T. JONES, Pennsylvania Power & Light Co., Allentown, Pa.
C. H. LEATHAM, Monongahela West Penn Public Service Co., Fairmont, W. Va.
J. C. SCOTT, Puget Sound Power & Light Co., Seattle, Wash.
HARRY A. SMITH, Nebraska Power Co., Omaha, Nebr.

HOME SERVICE COMMITTEE

Chairman, FERN SNIDER, Georgia Power Co., Atlanta, Ga.
MRS. VERA B. ELLWOOD, Wisconsin Electric Power Co., Milwaukee, Wis.
NANCY FINCH, Utah Power & Light Co., Salt Lake City, Utah.
VALENTINE THORSEN, Northern States Power Co., Minneapolis, Minn.
EMMA MAURICE TIGHE, Boston Edison Co., Boston, Mass.
CLARA ZILLESSEN, Philadelphia Electric Co., Philadelphia, Pa.

HOME LIGHTING EQUIPMENT SALES COMMITTEE

Chairman, HARRY RESTOFSKI, West Penn Power Co., Pittsburgh, Pa.
C. T. BAKEMAN, Puget Sound Power & Light Co., Seattle, Wash.
R. S. BELL, The Commonwealth & Southern Corp., New York, N. Y.
C. G. GLUECK, Ebasco Services, Inc., New York, N. Y.
C. D. HOLLISTER, New York Power & Light Corp., Albany, N. Y.
H. A. KEYS, Public Utility Engineering & Service Corp., Chicago, Ill.
MRS. B. E. MARSH, Nebraska Power Co., Omaha, Nebr.
H. P. MEGARGEE, American Gas & Electric Service Corp., New York, N. Y.
FRED STAACKE, Houston Lighting & Power Co., Houston, Texas.
C. A. STEVENS, Public Service Electric & Gas Co., Newark, N. J.
H. A. STROUD, Monongahela West Penn Public Service Co., Fairmont, W. Va.
J. S. SUTHERLAND, Alabama Power Co., Birmingham, Ala.
H. H. WEBB, The Dayton Power & Light Co., Dayton, Ohio.

LIGHTING SALES COMMITTEE

Chairman, S. L. DRUMM, New Orleans Public Service Inc., New Orleans, La.
A. C. BERGH, Florida Power & Light Co., Miami, Fla.
S. S. BRADFORD, Potomac Edison Co., Hagerstown, Md.
C. T. BREMICKER, Northern States Power Co., Minneapolis, Minn.
PAUL EVERY, Ebasco Services, Inc., New York, N. Y.
PAUL MANCHESTER, Blackstone Valley Gas & Electric Co., Pawtucket, R. I.
J. E. MUELLER, West Penn Power Co., Pittsburgh, Pa.
R. R. ST. JOHN, West Texas Utilities Co., Abilene, Texas.
H. M. SHARP, Buffalo Niagara & Eastern Power Corp., Buffalo, N. Y.
W. A. STANNARD, Consumers Power Co., Grand Rapids, Mich.
M. N. WATERMAN, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y.

POWER AND HEATING SALES COMMITTEE

Chairman, C. H. PURDY, Consumers Power Co., Jackson, Mich.
H. W. BAY, Public Service Electric & Gas Co., Newark, N. J.
THOMAS BURNS, American Gas & Electric Service Corp., New York, N. Y.
E. M. CLAPP, Georgia Power Co., Atlanta, Ga.
J. H. COATES, Ebasco Services, Inc., New York, N. Y.
J. R. HARTMAN, The Cincinnati Gas & Electric Co., Cincinnati, Ohio.
E. L. KAVANAUGH, The Detroit Edison Co., Detroit, Mich.
L. H. KNAPP, The Hartford Electric Light Co., Hartford, Conn.
P. D. LAWRENCE, Virginia Electric & Power Co., Richmond, Va.
F. MCQUILLIN, West Penn Power Co., Pittsburgh, Pa.
J. C. MURTHA, Consolidated Edison Co. of New York, Inc., New York, N. Y.
C. N. RACKLIFFE, Carolina Power & Light Co., Raleigh, N. C.
E. L. ROBINSON, Gulf States Utilities Co., Beaumont, Texas.
CHARLES SNYDER, Monongahela West Penn Public Service Co., Fairmont, W. Va.
J. H. SCOTT, Ohio Power Co., 30 Church St., New York, N. Y.
W. H. STUEVE, Oklahoma Gas & Electric Co., Oklahoma City, Okla.
C. P. YODER, Buffalo, Niagara & Eastern Power Corp., Buffalo, N. Y.

HOUSEHOLD APPLIANCES COMMITTEE

Chairman, M. R. RODGER, Middle West Service Co., Chicago, Ill.
J. E. AVERETT, Savannah Electric & Power Co., Savannah, Ga.
R. V. BAUER, Ebasco Services Inc., New York, N. Y.
O. R. DOERR, Pacific Gas & Electric Co., San Francisco, Calif.
O. M. JACKSON, Georgia Power Co., Atlanta, Ga.
H. A. KEYS, Public Utility Engineering & Service Corp., Chicago, Ill.
T. E. KUYKENDALL, West Texas Utilities Co., Abilene, Texas.
D. S. MELVIN, Consolidated Edison Co. of New York, Inc., New York, N. Y.
AUSTIN MONTY, Philadelphia Electric Co., Philadelphia, Pa.
L. R. PARKER, The Commonwealth & Southern Corp., New York, N. Y.
C. A. STEVENS, Public Service Electric & Gas Co., Newark, N. J.

UTILITY-DEALER SALES COMMITTEE

Chairman, R. P. WAGNER, New York Power & Light Corp., Albany, N. Y.
W. L. BERRY, Union Electric Co. of Missouri, St. Louis, Mo.
PAUL DELEON, Wisconsin Power & Light Co., Madison, Wis.
H. G. ISLEY, Carolina Power & Light Co., Raleigh, N. C.
H. P. MEGARGEE, American Gas & Electric Service Corp., New York, N. Y.
D. S. MELVIN, Consolidated Edison Co. of New York, Inc., New York, N. Y.
FRED OHLES, Ebasco Services Inc., New York, N. Y.
R. I. SEYMOUR, Kansas City Power & Light Co., Kansas City, Mo.

WIRING COMMITTEE

Chairman, G. W. HART, Ebasco Services Inc., New York, N. Y.
E. A. BRAND, Buffalo Niagara & Eastern Power Corp., Buffalo, N. Y.
O. K. COLEMAN, American Gas & Electric Service Corp., New York, N. Y.
F. E. DAVIS, Consumers Power Co., Jackson, Mich.
C. V. DUNN, Kansas City Power & Light Co., Kansas City, Mo.
C. M. FIFE, West Penn Power Co., Pittsburgh, Pa.
G. E. MILLER, The Cleveland Electric Illuminating Co., Cleveland, Ohio.
H. J. MORTON, The Detroit Edison Co., Detroit, Mich.
E. S. NORTHUP, Nebraska Power Co., Omaha, Nebr.
W. C. WAGNER, Philadelphia Electric Co., Philadelphia, Pa.
R. C. WENZ, Duquesne Light Co., Pittsburgh, Pa.

PERSONALS

H. G. ISLEY has been appointed general sales manager of the Carolina Power and Light Company, succeeding S. P. Vecker, now vice-president. Mr. Isley has been with the company 21 years, having served as commercial and residential sales manager since 1935. Prior to that time he was an appliance salesman and had held other positions.

Other promotions in the Carolina Power and Light Company organization included the following:

C. N. RACKLIFFE, manager of industrial sales, to assistant to Vice-President Vecker;

W. PAUL LYMAN to manager of industrial sales;

T. B. SMILEY to manager of domestic sales;

M. H. HICKS to manager of commercial sales.

EDWARD D. KING, vice-president, the Buffalo Niagara Electric Corporation, was honored recently in Buffalo for his long service with the company at a dinner attended by about 100 associates, including executives from Buffalo, Niagara Falls and New York City. Mr. King became identified with the electrical power industry of the Niagara frontier in 1905.

HOWARD W. COOPER, vice-president, Central Power and Light Company, Corpus Christi, Texas, has been appointed assistant to M. L. Hibbard, president of the Minnesota Power and Light Company. Mr. Cooper assumed his new duties at Duluth on Nov. 1.

J. J. MCDONALD has been transferred from the Olympia office of the Puget Sound Power and Light Company to the post of manager of the Winlock office, succeeding Walter Helander, assigned to new duties in Puyallup.

CHARLES A. TATTERSALL, secretary, Niagara Hudson Power Corporation, has been elected a vice-president of the corporation; he will continue also as secretary. Mr. Tattersall has been connected with the Niagara Hudson system for 32 years. He was employed in various departments of the Niagara Falls Power Company and predecessor companies, becoming assistant to the vice-president and general manager in 1919. In 1927 he became assistant to the president of Buffalo, Niagara and Eastern Power Corporation and later was elected a vice-president. He was also made an assistant vice-president of Niagara Hudson Power Corporation in 1931 and four years later was elected secretary.

G. L. FURR, assistant division manager of the Appalachian Electric Power Company at Bluefield, West Virginia, since 1936, was elected president of the Public Utilities Association of West Virginia at the recent convention at White Sulphur Springs. Mr. Furr entered the employ of his present company in 1916 as an electrician and returned to it upon completion of military service in the World War. He left again to join the lighting engineering department of the General Electric Company but soon returned, in 1922, in the capacity of operating engineer, and in 1928 was made general superintendent in charge of construction and operation of the Bluefield division. He became assistant division manager eight years later.

ROBERT D. STUART, JR., for some years general sales manager of the Fall River (Mass.) Gas Works Company, has been appointed general sales manager of the Blackstone Valley Gas and Electric Company, Pawtucket, Rhode Island. He succeeds the late William E. McCreery.

GEORGE WILMARTH, for the past 13 years chief operating engineer of the Northern States Power Company, Minneapolis, has resigned because of ill health. Mr. Wilmarth's association with the Standard Gas and Electric Company, parent organization of Northern States Power, began in 1910, when he became general superintendent of the Red River Power Company at Grand Forks, North Dakota. Later he joined the Oklahoma Gas and Electric Company, but left it in 1923 to become manager of the Wisconsin division of the Northern States Power Company. He was appointed chief operating engineer in 1927.

"Alice in Electric Wonderland" Scores Big Hit

(*Continued from page* 529)

example of all of these "Alice in Electric Wonderland" shows, and is quite typical of many others. It is given in full:

"The Rains Came," and they came in torrents, but they failed to keep the good folk of Willimantic, Conn., from turning out by the scores to attend the evening performance on November 13th and the Thursday afternoon, November 14th, matinee of *Alice in Electric Wonderland*.

This dramatic presentation of the electric cooking story is offered by the Modern Kitchen Bureau in its 1940 Fall Promotional Plans. It is a "natural" for a stage show and cooking demonstration.

The Connecticut Light and Power Company at Willimantic recognized the value of this promotion, and under the leadership of Frank Crosthwait, local Commercial Manager, decided to carry it out as suggested by the Bureau.

Miss Dorothy Sherlock, able Home Service Representative of the Company, recruited from the dramatics class of Windham High School an excellent group of five girls who, with Miss Crane of the Willimantic sales department and herself, completed the entire cast of the show.

Several newspaper advertisements calling attention to the show were run in the local papers, together with publicity in editorial columns. Oil-skin dish covers were given all who attended, together with a folder giving the recipes of the Wonder Meal which Miss Sherlock cooked in her demonstration.

The Home Service Auditorium in which the *Alice in Electric Wonderland* show was given, is in the Connecticut Light and Power Company's new building in Willimantic. It is a beautiful hall built to seat 200 people. The electric kitchen on the stage is the last word in modern beauty and efficiency. The building is a considerable distance from the shopping center of Willimantic and for this reason there is not a great deal of floor traffic on the sales floor. Never before had such crowds as turned out for the *Alice in Electric Wonderland* shows been in to view the new premises.

About 350 people crowded in the hall for the evening show, and a number had to be turned away. The following afternoon, in very bad weather, 170 ladies came on foot or by taxi to attend the second performance.

The consensus of all who had anything to do with the execution of this fine M. K. B. promotion in Willimantic is that *Alice in Electric Wonderland* is an excellent vehicle through which to promote not only the benefits of electric cookery but also good public and dealer relations.

Transmission and Distribution Committee Meeting

(*Continued from page* 532)

inspection of standing poles which is a joint study being carried on by the Transmission and Distribution Committee and the Accident Prevention Committee.

Through the assistance of Mr. C. B. McManus of the Georgia Power Company, who had made the local arrangements for this meeting, several inspection trips had been planned, one of which was a trip to the treating plant of the Southern Wood Preserving Company near Atlanta. In addition to this, several other inspection trips had been arranged to various parts of the transmission and distribution systems of the Georgia Power Company in the vicinity of Atlanta.

It was announced that the next meeting of the committee would probably be held in Detroit during the week of Feb. 17.

CONVENTIONS AND MEETINGS

NOVEMBER

11-12 Wisconsin Utilities Association, Electrical Section, Commercial and Technical Divisions, Pfister Hotel, Milwaukee, Wis.
14-15 Illinois Public Utilities Association, Pere Marquette Hotel, Peoria, Ill.
14-16 Annual Commercial Conference, Southeastern Electric Exchange, Atlanta, Ga.

DECEMBER

2-3 Prime Movers Committee, EEI Headquarters, New York, N. Y.
2-4 Fourth National Accounting Conference, AGA-EEI, Book-Cadillac Hotel, Detroit, Mich.
2-5 American Society of Mechanical Engineers, New York, N. Y.
9-11 National Warm Air Heating and Air Conditioning Association, Detroit, Mich.
10-12 National Association of Railroad and Utilities Commissioners, Miami, Fla.

JANUARY

13-17 National Retail Dry Goods Association, New York, N. Y.
15-18 American Society of Civil Engineers, Baltimore, Md.
16-17 Missouri Valley Electric Association, Power Sales Conference, President Hotel, Kansas City, Mo.
27-29 American Society of Heating and Ventilating Engineers, Kansas City, Mo.
27-31 American Institute of Electrical Engineers, Philadelphia, Pa.

FEBRUARY

10-12 Electrical Equipment Committee, EEI, Statler Hotel, Detroit, Mich.
17-19 Transmission and Distribution Committee, EEI, Statler Hotel, Detroit, Mich.
17-21 National Electrical Manufacturers Association, Chicago, Ill.

MARCH

27-28 Missouri Valley Electric Association, Continental Hotel, Kansas City, Mo.

APRIL

29-30 Chamber of Commerce of the U. S. A., Washington, D. C.

MAY

11-15 National Electrical Manufacturers Association, The Homestead, Hot Springs, Va.
18-23 National Electrical Wholesalers Association, The Homestead, Hot Springs, Va.

JUNE

2-5 EDISON ELECTRIC INSTITUTE, Buffalo, N. Y.

Cheap Power Isn't Everything

LOW-COST electric power will not of itself bring to Northwestern Alabama the prosperity that optimistic promoters here predicted, Herman Frederick Otte concludes in his recently published "Industrial Opportunity in Northwestern Alabama" (Col. Univ. Press. $2.25) a detailed study of the history and prospects of the seven counties comprising the river basin between the Pickwick Landing and Guntersville dams of the TVA.

"Industrial opportunity in this Region depends on the Region's comparative advantages, for this small area can produce only if it can successfully meet its competitors in the nation's markets. . . . The Region is not in a favored competitive location when viewed from the standpoint of markets. There are no large concentrated centers of consumption within and adjacent to it. . . .

"Present changes in the structure of industry in this Region and those that appear to be impending do not foreshadow a great industrial boom. . . . This is so because the factors which the Region has in abundance and at low cost either are available over extensive areas or can be made available in many parts of the nation. This is even true as regards power. . . .

"The factors which would enable the development of a great industrial area, namely, low cost and quick access to large markets; an unusual combination of large reserves of industrially important raw materials so situated that they could be most economically processed in the Region; unique skilled labor,—or a combination of some of these factors—these the Region never did have and does now now have. . . . "

The book provides a detailed and documented study of the fundamental economic factors which goven the growth of communities.

OFFICERS AND COMMITTEES OF THE EDISON ELECTRIC INSTITUTE

1940-1941

OFFICERS

C. W. KELLOGG, *President*
420 Lexington Avenue, New York, N. Y.

PAUL M. DOWNING, *Vice-President*
Pacific Gas & Electric Co., San Francisco, Cal.

J. E. DAVIDSON, *Vice-President*
Nebraska Power Co., Omaha, Neb.

A. H. KEHOE, *Vice-President*
Consolidated Edison Co. of New York, Inc., New York, N. Y.

W. E. MITCHELL, *Vice-President*
Georgia Power Co., Atlanta, Ga.

H. S. BENNION, *Vice-President & Managing Director*
420 Lexington Avenue, New York, N. Y.

F. H. NICKERSON, *Treasurer*
Consolidated Edison Co. of New York, Inc., New York, N. Y.

MAE B. WOODS, *Secretary*
420 Lexington Avenue, New York, N. Y.

OPERATING COMMITTEE

Chairman, C. W. KELLOGG, New York, N. Y.

E. R. ACKER, Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y.

J. M. BARRY, Alabama Power Co., Birmingham, Ala.

H. C. BLACKWELL, The Cincinnati Gas & Electric Co., Cincinnati, Ohio.

H. B. BRYANS, Philadelphia Electric Co., Philadelphia, Pa.

W. H. BURKE, Ebasco Services Incorporated, New York, N. Y.

C. L. CAMPBELL, The Connecticut Light & Power Co., Hartford, Conn.

F. L. CONRAD, The United Light & Power Service Co., Chicago, Ill.

J. E. DAVIDSON, Nebraska Power Co., Omaha, Neb.

R. E. DILLON, Boston Edison Co., Boston, Mass.

PAUL M. DOWNING, Pacific Gas and Electric Co., San Francisco, Calif.

E. T. GUSHEE, Union Electric Company of Missouri, St. Louis, Mo.

A. H. KEHOE, Consolidated Edison Co. of New York, Inc., New York, N. Y.

WILLIAM KELLY, Buffalo Niagara & Eastern Power Corp., Buffalo, N. Y.

FRANK MCLAUGHLIN, Puget Sound Power & Light Co., Seattle, Wash.

W. E. MITCHELL, Georgia Power Co., Atlanta, Ga.

F. H. NICKERSON, Consolidated Edison Co. of New York, Inc., New York, N. Y.

J. F. OWENS, Oklahoma Gas & Electric Co., Oklahoma City, Okla.

W. H. SAMMIS, The Commonwealth & Southern Corp., New York, N. Y.

CHESTER C. SMITH, Kansas City Power & Light Co., Kansas City, Mo.

PHILIP SPORN, American Gas & Electric Service Corp., New York, N. Y.

E. C. STONE, Duquesne Light Co., Pittsburgh, Pa.

E. S. THOMPSON, American Water Works & Electric Co., New York, N. Y.

G. W. VAN DERZEE, Wisconsin Electric Power Co., Milwaukee, Wis.

P. S. YOUNG, Public Service Electric & Gas Co., Newark, N. J.

CHAIRMEN OF THE COMMITTEES

Accident Prevention, W. R. SMITH, Public Service Electric & Gas Co., Newark, N. J.

Accounting Executive, G. H. BOURNE, The Commonwealth & Southern Corp., New York, N. Y.

Classification of Accounts, A. M. HARTOGENSIS, Ebasco Services, Inc., New York, N. Y.

Customers' Relations, Commercial Accounting and Collections, L. A. MAYO, The Connecticut Light & Power Co., Hartford, Conn.

Depreciation, H. L. GRUEHN, Consolidated Gas Electric Light & Power Co., Baltimore, Md.

Plant Accounting and Records, H. B. HARDWICK, The Commonwealth & Southern Corp., New York, N. Y.

Purchasing Stores and Transportation, G. MCDOUGALL, Consolidated Edison Co. of New York, Inc., New York, N. Y.

Electrical Equipment, R. W. WILBRAHAM, United Engineers & Constructors, Inc., Philadelphia, Pa.

Hydraulic Power, E. B. STROWGER, Buffalo, Niagara & Eastern Power Corp., Buffalo, N. Y.

Insurance, J. H. NICKELL, Philadelphia Electric Co., Philadelphia, Pa.

Membership, EDWARD REYNOLDS, Columbia Gas & Electric Corp., New York, N. Y.

Prime Movers, E. L. HOPPING, Philadelphia Electric Co., Philadelphia, Pa.

Prize Awards, H. P. LIVERSIDGE, Philadelphia Electric Co., Philadelphia, Pa.

Rate Research, F. A. NEWTON, The Commonwealth & Southern Corp., New York, N. Y.

General Sales, R. E. FISHER, Pacific Gas & Electric Co., San Francisco, Cal.

Statistical, W. T. NEEL, Philadelphia Electric Co., Philadelphia, Pa.

Transmission and Distribution, W. F. NIMMO, Virginia Electric & Power Co., Richmond, Va.

Codes and Standards (a Subcommittee of the Operating Committee)
A. H. KEHOE, Consolidated Edison Co. of New York, Inc.
New York, N. Y.

BOARD OF TRUSTEES
OF THE
EDISON ELECTRIC INSTITUTE

1940-1941

(*Terms expiring* 1941)

FRANK D. COMERFORD.....Boston Edison Company, Boston, Mass.
SAMUEL FERGUSON.....The Hartford Electric Light Company, Hartford, Conn.
P. H. GADSDEN.....The United Gas Improvement Company, Philadelphia, Pa.
C. E. GROESBECK.....Electric Bond and Share Company, New York, N. Y.
W. J. HAGENAH.....Public Utility Engineering & Service Corp., Chicago, Ill.
EDWARD REYNOLDS.....Columbia Gas & Electric Corporation, New York, N. Y.
A. H. SCHOELLKOPF.....Niagara Hudson Power Corporation, New York, N. Y.
E. W. WAKELEE.....Public Service Corporation of New Jersey, Newark, N. J.

(*Terms expiring* 1942)

JAMES B. BLACK.....Pacific Gas and Electric Company, San Francisco, Cal.
JAMES F. FOGARTY.....The North American Company, New York, N. Y.
C. W. KELLOGG.....Edison Electric Institute, New York, N. Y.
B. W. LYNCH.....Duquesne Light Company, Pittsburgh, Pa.
A. C. MARSHALL.....The Detroit Edison Company, Detroit, Mich.
THOMAS N. McCARTER.....Public Service Electric and Gas Company, Newark, N. J.
H. HOBART PORTER.....American Water Works & Electric Company, Inc., New York, N. Y.
HERBERT A. WAGNER.....Consolidated Gas, Electric Light & Power Company of Baltimore, Baltimore, Md.
JUSTIN R. WHITING.....The Commonwealth & Southern Corporation, New York, N. Y.

(*Terms expiring* 1943)

FLOYD L. CARLISLE.....Consolidated Edison Company of New York, Inc., New York, N. Y.
HARVEY C. COUCH.....Arkansas Power & Light Company, Pine Bluff, Ark.
OSCAR FOGG.....Consolidated Edison Company of New York, Inc., New York, N. Y.
PHILIP G. GOSSLER.....Columbia Gas & Electric Corporation, New York, N. Y.
H. P. LIVERSIDGE.....Philadelphia Electric Company, Philadelphia, Pa.
P. L. SMITH.....Middle West Corporation, Chicago, Ill.
GEORGE N. TIDD.....American Gas & Electric Company, New York, N. Y.
JOHN E. ZIMMERMANN.....The United Gas Improvement Company, Philadelphia, Pa.